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## ART. I.—DUALITY AND DECUSSATION.

### (EXPLANATION OF THE MUTUAL RELATIONS OF THE DOUBLE BRAIN AND DOUBLE BODY.)

At the first glance we perceive that the brain is not a single, but a double organ. Each hemisphere is a complete brain, possessing all the organs that belong to man. It would not, therefore, be improper to speak of the right brain and the left brain distinctly, as two complete brains, so connected as to act in unison.

As each brain is complete, possessing every organ, there can be no such thing as single organs. Persons unacquainted with anatomy frequently make the mistake of supposing that there are single and double organs, because they see on the phrenological bust some organs on the median line apparently single.

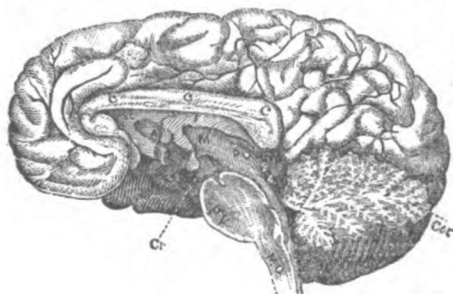
The organs of the right hemisphere, along the median line, have corresponding organs of the left hemisphere adjacent to them across the line, and these corresponding organs may therefore be conveniently surrounded by one external boundary, and indicated by one name; as, for example, the organ of Benevolence, although we have not one central organ of Benevolence, but two organs (one in each hemisphere) lying adjacent to each other, but separated by the firm membrane called the falx, and by the longitudinal sinus, a large blood-vessel lying between the hemispheres in contact with the skull, and separating the convolutions half an inch at the surface. Thus all the organs along the median line of the external cranium are double, and as perfectly distinct as those which are located farthest apart.

This doubleness of the brain accounts for the fact, that organs are so seldom destroyed by injuries of the head, or even by pathological changes in the brain. Unless two corresponding convolutions (one

in each hemisphere) are injured or destroyed, the mental faculty will not be lost, for one of the cerebral organs is adequate to manifest the faculty after the destruction of its counterpart in the opposite hemisphere. We do not lose the sense of sight by the destruction of one eye, nor the sense of hearing by the obstruction of one ear, nor the proper influence of respiration by the loss of half the lungs. In like manner, any one of the double organs in the brain is sufficient for the mental function, and an entire hemisphere may be diseased without the loss of any special faculty.

Having two complete brains, the question arises, why we have not two distinct minds? Why may not one brain act differently from the other; why may they not think on different subjects, and have different desires at the same moment? Why may not a difference in the circulation of the blood or in the health of the two hemispheres give them conflicting characters? Why have we a single consciousness and a single will, instead of double?

To answer this question we examine the union of the hemispheres, and find that they are connected across the median line by a multitude of fibers. The white fiber, which is distributed through the interior of the brain, and forms a part of every organ, converges toward the median line, and separating from the semi-pulpy, brownish substance, passes from side to side in a stout band, called, from its firmer texture, the *corpus callosum*. By this band the hemispheres



This engraving represents the internal aspect of the right half of the brain, divided on the median line from the left half. The cut surfaces are as follows: M. O. Medulla Oblongata, (connecting with the spinal cord); C C C Corpus Callosum, connecting the cerebral hemispheres; P. V. Pons Varolii, commissure connecting right and left cerebrum; A. M. P. Anterior, Middle, and Posterior Commissures; S. L. Septum Lucidum; F. Fornix; q. b. right pair of Quadrigeminal Bodies, between cerebrum and cerebellum; Cr. Crus of the right hemisphere, being fibers from the Medulla Oblongata and Pons to Cerebrum.

are joined for a space of three or four inches, from front to back, and all the convolutions of each hemisphere brought into connection with the corresponding convolutions of the other. In addition to this, we have the commissures. The anterior commissure, a small body of fibers connecting the corpora striata and middle lobes; the middle and posterior commissures connecting the large ganglionic bodies of fiber at the basis of the brain; and the Pons Varolii, a band of fibers connecting the hemispheres of the cerebellum, as the corpus callosum connects those of the cerebrum. Moreover, the lateral halves of the spinal cord and medulla oblongata communicate together, and there are other communications in the course of the progressive bands of white fiber from the spinal cord to the hemispheres. Which of these communications are the most essential, I



cannot say, with certainty; but there is certainly a sufficient apparatus of union to unitize the cerebral action.

I am disposed to regard the corpus callosum as the highest in rank among the fibers of union, although, perhaps, less essential than the connections which are nearer the basis. The corpus callosum is the especial bond of the convolutions, or organs of the higher faculties, and does not exist in the greater portion of the animal kingdom. In birds, and all inferior animals below the class of mammalia, the corpus callosum does not exist, because the convolutions which it unites are absent. The lower commissures are probably more necessary to the animal life, and the corpus callosum to the mental. The severance of the corpus callosum does not appear to be fatal, as we have two instances reported of its being severed, along the median line, in persons of very deficient intellect; but great disorder of the muscular system is produced when we interfere with the inferior apparatus. When we cut upon the Pons Varolii, the connecting fibers of the cerebellum, in animals, (according to Majendie), their movements are unbalanced and they have violent rotations from left to right, or right to left, according to the manner in which we cut upon either side of the median line.

If we interfere with all this apparatus of union in the impressible constitution, we produce results highly interesting. The unity of the mind, the self-possession, the energetic will and the co-operation of the limbs are diminished or lost. Doubtless, the most diversified and singular experiments might be made in this way, but I have always had too much regard for the subjects of these experiments to expose them to strange and hazardous trials.

To affect the unity of the hemispheres, we apply the hand along the median line, backward and forward. The movement of the hand (the fingers pointing close to the head) along the median line, transmits an influence into the interior of the brain upon the region of the junction of the hemispheres. In moving the hand from front to back we produce a rather stimulating, and by the opposite process, a benumbing or prostrating effect. By the two operations, in rapid succession, a confusing effect is produced, which must tend to pervert the functions of that region. It is a region of high impressibility, calculated to feel the most delicate influence, and capable of various results according to the character of the experiment.

Operating in the above manner, for the first time, upon a young man of the highest susceptibility, a complete discord of the hemispheres was produced. The eyes, directed by dissociated influences, lost their focal tendency and looked apart in different directions; the expression of the countenance became wild, and the movements confused. When we requested him to bring his two hands together, he made the effort, and raised one hand on each side, irregularly, but could not bring them to meet. We raised him from the chair to his feet, but he could neither walk nor stand. His rude and confused efforts, his wild expression of countenance and general disorder

of the movements, were so unpleasant and alarming that we did not venture to carry the experiment further. This experiment has been tried with similar effect upon others, but never carried to its utmost results, for fear of injuring the subjects.

In one, a lady of delicate structure, a few movements of the hand forward along the median line would produce immediate prostration of the whole system. She described the sensation as being somewhat like that of a knife passing through the head, though unaccompanied by the pain.

In another, of highly cultivated and vigorous mind, who consented to undergo the experiment to gratify her own love of philosophical knowledge, I found, after a few movements, that the divergence of the eyes was distinctly produced with a peculiar state of mind. I paused to inquire if she was willing to have it carried further, and as she expressed a willingness to undergo any experiment if I could protect her against any ulterior injury to her health, it was continued until a very singular state of mental and bodily excitement was produced. The physiological balance was so completely destroyed that she was unable to sit erect. Her head and whole body would recline to one side, and as she made the effort to correct the bias, she would go over in the opposite direction. Between the two impulses, which she could not concentrate and balance, she continually leaned in one direction, or rocked from side to side. Her mental phenomena were equally singular; to these I may allude hereafter.

After continuing her some time in this state, I proceeded to relieve her; but she insisted upon being allowed to remain as she was, and manifested a morbid sensitiveness as to being touched. I resisted these morbid inclinations and made the usual efforts to restore her, but I found that the high mental excitement of the interior intellectual organs had so exhausted the system that it was very difficult. This libration continued for an hour to some extent, in spite of all that could be done to equalize the functions of the system, and the debility was so great that it was barely practicable to give her sufficient energy to walk home, and even then the same tottering tendency and the same state of mind could be partially renewed by recalling the scene to her mind, until the debility, &c. gradually wore off.

Although I have not carried this experiment so far as to sever the conscious identity, disease, we know, sometimes apparently accomplishes it. In the delirium of fever a species of double consciousness is sometimes produced. I recollect distinctly experiencing this during a formidable attack of bilious fever, at Natchez, when I found that, instead of being one person, there were two of us, and before I could move in bed we had to consult together as to what we would do. A case has been reported, (by Dr. Bright), in which the patient afterward said, that "the state of his mind during delirium was such as to make him believe himself two persons, one of which, as in a dream, had committed murder, was tried and condemned, while the other was alive to real persons and things around him." (In such

cases there is, perhaps, really no double consciousness, but only an imaginative delusion in reference to double personality).

To destroy the unity of the mind by any of our experiments, is, I presume, impossible in a state of sanity, but doubtless the physiological unity may be affected, and the hemispheres may be so differently excited as to produce something approximating a simultaneous double consciousness.

The unity of the hemispheres maintained by their commissures does not prevent their being frequently in different conditions, by disease, or by excitement, and almost always different in their development. They are different in their original growth or formation, and unite at the median line by the corpus callosum only in the latter stages of their development.

The two halves of the body have a similar independence in their condition, growth, and original development. They are formed independently: those portions which lie along the median line as single organs, apparently, are really double, composed of halves independently developed, and at length uniting into one. The frontal bone and the occipital are each originally developed as two bones, which unite along the median line so as to obliterate the traces of separation. In consequence of this independence of the two hemispheres and the two halves of the body, it often happens that disease is accurately bounded by the median line, or at least presents a contrast on the right and left sides.\* This is so familiar a fact in paralysis as to originate the term, *hemiplegia*. Lesions of sensibility are often accurately bounded by the median line, which separates the borders of the sensitive and insensible portions of the surface. Even the trachea may be found in opposite conditions on the right and left side, an inflammation being bounded by the median line. The pupil of one eye may be dilated in consequence of injury to one side of the brain, while the opposite eye retains its normal condition. A patient of Sir. Benj. Brodie's, after a blow fracturing the parietal bone on one side of his head, presented no other symptom but pain and a remarkable dilation of one of the pupils. The

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\* "The doctrine is now held by some of the best anatomists, that all the organs of the body are symmetrically double in their earliest state, even those which subsequently form cavities or continuous tubes. Pathology follows and supports the same view in the general fact, that where organs are symmetrical as regards the median line of the body, or contain a median line in their own structure, there is a tendency in all morbid actions to terminate at these lines; a tendency often hidden or obscured by other circumstances, yet obvious enough to form a principle of frequent application in the treatment of disease.

"It would be worth while, as a curious point in Pathology, to collect the various cases in which diseased action or structure terminate or undergo change at the median line in the organs affected. Many such are familiar to the most common observation, when the difference exists not merely in the sensations, but also in the texture and intimate functions of the two sides. I might name as an example, more singular from a tube being concerned, certain inflammations of the larynx and trachea, in which the vascular injection is perceived in one-half only of the circumference of the tube, the other half preserving its ordinary appearance. Andral states that he has made the observation in several cases where one lung only was diseased, and this on the same side as the affection of the trachea."—Holland, *Med. Notes*.

two sides of the body often differ materially as to their heat, their strength, and their growth or wasting away. It is a singular illustration of this duality, that the chameleon (according to Mr. H. Slight), frequently changes color on one side only and presents two colors on the two sides of its body, as a stone color and a green.

This partial independence of the hemispheres and of the right and left halves of the body, leaves them to be developed in different degrees and in a different form in every individual. The correspondence of the hemispheres is never very exact. There is always difference enough in their development and form to make it difficult to point out the exactly corresponding convolutions. This difference is perceptible in animals in various degrees:—In quadrupeds, according to Vimont, less than in man; in birds still less, and in reptiles imperceptible. In fish, as no cerebral hemispheres exist, we have no such comparison to make.

This difference, whatever may have been its original cause, is now the hereditary conformation of each individual; for Tiedemann's researches in embryology show original differences of the right and left sides, in the evolution of the brain, and universal experience proves the transmission of the cerebral structure by uniform laws of descent. Perhaps the ultimate cause may be found in the differences of the right and left sides in the interior of the body, and in the general use of the right hand in preference to the left.

But the wonder to be explained, is, not that there should be differences between the right and the left sides, but that they should so well correspond and unitize in action. The problem of unity is not easily solved by mere physical or physiological considerations. It refers to the ultimate vital and spiritual laws of man. Each hemisphere appears complete in its structure, and capable of all the sensations, thoughts, and impulses that fill up the life of man. Each hemisphere has under its control the entire half of the body, and receives sensitive impressions of pleasure or pain in this manner, independently of the other hemisphere. It would seem impossible that their impressions and thoughts should be the same, or their emotions and impulses should entirely coincide; for one half the body often materially differs from the other half in strength and health. One half is better educated than the other; one half is often in pain while the other is in perfect comfort.

Thus it would seem, that the two complete brains are supplied with two rather distinct bodies, and capable of acting against each other. Yet man is not the unbalanced machine which such a constitution indicates. All parts of the human system revolve, like the planetary heavens, in well-defined orbits around their central, controlling, light-giving power—the sun in the heavens, and the soul in man—God in the Universe, or macrocosm, and the image of God in that microcosm, the human body.

All parts are kept in their spheres, because all parts are directly dependent on the brain, which controls them through the nerves,

and the brain is dependent upon the union of the hemispheres. There is not a distinct legislative power for each hemisphere; for the right man and for the left man; but one supreme legislative power for both hemispheres, in which there is a general representation of the individual portions of the brain. From each and all of the organs white fibers run to represent them in this central band of union; and here, in the vicinity of this general representation, the aggregate and controlling power resides. Here, to speak architecturally, is the keystone of the arch. Here is the conjunction of mind and matter; the throne of the soul; which lives in the center of our being, and commanding equally the right man and the left man, welds them into one, and uses each hemisphere and every organ as it wills to bring them into play. As this is the point of conjunction between the spiritual and material, it is here that positive physical science blends with psychology; and if it be possible to ascend from the subtlest truths of physiology, into the empyrean regions of spiritual science, this must be our point of departure.

Taking man, soul, and body, in the aggregate, neurology points out a higher philosophy, which is intensely interesting, and which contains unfathomable depths. At present, let us survey only the lower aspect of the science, that which looks toward matter and manifestations in matter—not the higher aspect of humanity—its relations toward God and the Universe.

There are those, even among men of excellent intellect, and of ardent, honest love of truth, who doubt, or disbelieve the existence of this higher science, and look upon man as merely a rational organism, in which the spiritual nature is not an actual being, but merely an attribute of organized matter; who regard the physical world as all that exists, and God and soul as mere abstractions, or names for properties and attributes which reside in matter. We must confess, there is a high degree of plausibility in their arguments, but in the experiments of Neurology, there are facts, which indicate plainly, the independent, substantive existence of the spiritual principle of man, as a something independent of his organism, and capable of surviving his body with high and increasing powers. If we can establish the independent existence of the spiritual in a single instance, skepticism must yield, and the whole field of spirituality—psychology and theology—must be admitted within the pale of positive science.

By means of a controlling Divine power, we can easily conceive the existence of a universal adaptation of parts and unity of design in creation. By means of a spiritual principle, a soul, we can easily conceive the mental and physiological unity of our double persons.

If *power* arises from *matter*—if mentality be but a manifestation or phenomenon of the various masses of the brain—it is difficult to conceive how anything but discord should arise from these discordant, antagonistic functions, and the multiplicity of external impres-

sions which they receive. But if power flows in from above—if a high and unitary existence, the soul, gives conscious vitality to matter, and, at the same time, subjects and unites it into a disciplined being—this satisfactorily explains our mental unity.

The next important question that arises, is; how these hemispheres act in relation to the body? Do both hemispheres act upon the body in conjunction, in perfect unity; or does each hemisphere belong to one half of the body, and to that alone?

Although there is a great deal of co-operation between the hemispheres, each has its independent connections with the body; not with the whole body, but with the half of it. The two hemispheres, separately, govern the two halves of the body; and, what is most remarkable, each hemisphere governs the *opposite* half of the body. The right hemisphere governs the left side, and the left hemisphere the right side.

This diagonal connection is produced by what is called the decussation or crossing of the nerves, which anatomists have detected in the *medulla oblongata*, and the optic nerve. But the doctrine of decussation, in the full and unqualified form in which I present it, asserting that each hemisphere belongs alone to the opposite half of the body, is not the established doctrine of our present anatomists and physiologists. From the days of Hippocrates down, it has been supposed that such a diagonal connection existed, because injuries or diseases of one side of the brain, were followed by a paralysis of the opposite side of the body. Mistichelli detected the decussation in the medulla oblongata, and, although many distinguished anatomists denied it, (for no important and useful truth, in their own science, has ever met with an entirely favorable reception from the dignitaries of medicine), it is now generally admitted, that this decussation, or crossing of fibers, does exist; and, indeed, any one may see it who chooses to dissect a brain. Let him separate the nervous bundles of the medulla oblongata, on the median line, and it will be perfectly distinct between them. The wonder is, that any could have been found hardy enough to deny it; but, as human nature is much the same now as in the days of Mistichelli, we see many of the medical profession still willing to repudiate the evidence of their senses, rather than be taught anything new.

At present, anatomists, generally, do not believe that the decussation is complete. They believe, only, that a few fibers cross, and merely use the fact to explain why paralysis crosses from the hemisphere affected to the opposite side of the body. It is also asserted, that there is some decussation in the optic nerves, but whether it is complete or partial, and whether there is any *real* decussation, is not yet finally settled. Even Gall and Spurzheim felt that they had but limited views of these subjects, as they had no mode of experimenting upon the brain, and had no other knowledge of the subject, than what was accessible to every anatomist.

The truth is, anatomy will not reveal physiology; it has not

taught us what we know of the functions of nerves. If we would know the powers of our organs, we must study *function* rather than *substance*. If we would ascertain whether the excitement passes from one hemisphere to the opposite side of the body, let us excite the hemisphere and observe whether the effects appear on the opposite side, or on the same side. If the effect of an operation on the left hemisphere uniformly appears on the right side of the body, we know that the influence has crossed, whether we can trace the anatomical route or not. We can trace a decussation, as anatomists generally admit, and the additional connections between the spinal columns, pointed out by Mr. Solly and Sir Chas. Bell, lead to the hope that the whole decussation may yet be detected. (For applying the law of decussation to the phenomena of any case, it will be necessary to retain it distinctly in the mind, and avoid confusion, which may be done by associating it with some visible object. A pair of scissors, for example, will answer the purpose; the handles will represent the cerebrum and medulla oblongata, while the blades, especially if long, may represent the spinal cord and nerves, distributed through the body.)

According to my experiments, the decussation of function appears to be complete and unqualified. There appears to be no *direct* connection between the right brain and the right body, nor between the left brain and the left body; for the only direct connection which exists, is the diagonal connection of the right brain with the left body, and the left brain with the right body. When you move the right arm, the volition comes from the left hemisphere; when you move the left, it is the right hemisphere that commands it. When you look with the right eye, it is the left hemisphere that sees by means of the convolutions lying behind the brow; and, in like manner, the right hemisphere looks through the left eye, and in all its excitements uses that eye as the organ of its expression. When you taste with the tongue, the right half of it sends its impressions to the middle lobe of the left hemisphere, and the left half, to the middle lobe of the right. If, then, we should destroy the organ of taste in the right hemisphere, the left half of the tongue would be insensible to tastes. If we destroy the organ of taste in the left hemisphere, the right half of the tongue would be equally insensible. So with the other senses. The man whose right ear is deaf, loses the activity of the organ in the left hemisphere, and if this is long continued, it will absolutely diminish, sometimes, even so much as to be visible externally; for the bone is thin, and accommodates itself readily to the brain at the site of this organ. A very acute observer may sometimes detect a defective or inferior development of the organ of hearing upon the side connected with the defective ear—i. e.—upon the opposite side of the head.

So it is in reference to the sense of vision. The man who is blind in the right eye, will lose the power of the left perceptive organs; and *vice versa*. You will find it interesting to make obser-

vations upon this point. I obtained, at Erie, Alabama, in the year '37, the skull of a man named Curry, (who had been hung for killing his brother), in which I found an excellent illustration of these principles. That skull greatly increased my confidence in these views; for I had not then discovered the mode of experimenting upon the brain. Curry was blind in his right eye, and, in consequence of this, all the perceptive organs of the left hemisphere had shrunk to such an extent as would strike the eye at the first glance. There was not any remarkable difference externally, but the internal plate of the frontal bone had shrunk, upon the left side, so as to enlarge the frontal sinus to the breadth of about half an inch. The difference became very obvious by sawing the skull horizontally through the sinus. This sketch will give a correct idea of the difference of the two sides of the skull.



As the brain and body sustain these sympathetic relations, I believe it possible, to judge of the developments of the different organs of the body by the development of the corresponding portions of the head, as nearly as the rudeness of craniology will permit. Whenever you meet with any important inequality of senses, limbs, or body, on the right and left sides, I invite you to apply these principles, guided by the physiological bust. There is one application, which you can make in every head that you see.

We are all unequally developed. We are generally right-sided, right-handed, right-footed; a few are decidedly left-handed. When you examine the head of a right-handed man, you will find that the left hemisphere is the best developed, particularly in those portions which give muscular power and energy of character. In the skull, generally, the difference is obvious; and in most heads you may observe it by carefully examining the occiput. The left hemisphere of the occiput will generally be found fuller, rounder, deeper, and more prominent. If you place your hand upon the occiput along the median line, where you can best make the comparison, you will observe, by carefully examining, that the left hemisphere generally projects farther than the right. Still, it frequently happens, on account of the thickness of the occipital bone, that this difference of the hemispheres is difficult to perceive, until we look into the interior of the skull.

Just before I brought forth my neurological discoveries, I had an opportunity of applying to a skull the principles which I have just stated. This skull was presented to me for the purpose of deciding upon its character. It was one of those heads in which a moral degeneracy had occurred; handsomely formed on the outside, but



bearing the marks of degeneracy internally, as you see when I insert this light through the *foramen magnum*. The translucency of the bone over the selfish organs, and the opacity of the moral region, tells the whole story. I gave my opinion according to the indications which you see, and it was published as a remarkable illustration of the science. This is the skull of an executed murderer, named Williams. The most remarkable thing in the opinion was, that I spoke of the great inequality of his lower limbs. My observations upon heads had taught me something of the physiological functions of the brain, and my pathognomic system of Phrenology recognized the basis of the occiput as the region corresponding to the lower limbs. When I saw the large, deep development of the left occiput, compared with the right, I had no doubt of the comparative inferiority of his left limb. In confirmation of this, I was told that his left leg had been, in his youth, so severely injured by fire, that he had never been able to use it, but had walked upon a crutch. Being remarkably muscular, he had acquired so much dexterity with his crutch, that in running, jumping, and other athletic feats, he was quite famous. He could leap on horseback from the ground with ease. Such was his physical prowess, that having become enraged while confined in jail and in chains, he drove off every person who attempted to enter the apartment, and no one dared to touch him, until a citizen, by counterfeiting the character of a drunken prisoner, gained admission unopposed, and then sprang upon his back. This athletic man, you perceive, has a large development of the athletic region of the brain—the occiput; and the chief difference of his occipital lobes is the difference of their depth. They are equal on the median line of the upper occiput; and this corresponds to the fact that he shot equally well, right-handed or left-handed. In the opinion which I pronounced upon Williams, I felt additional confidence from the fact, that I had seen a somewhat similar case at Alexandria, La. A negro insurrection had been organized along the Red River, in the year 1837;\* it was detected upon the eve of breaking out, and a number of the leading conspirators executed. I obtained the crania of several, and here is one of them, of a negro man named Moses.

The singular irregularity of this head, led me to inquire into his bodily peculiarities; and I ascertained that he was lame in one leg. It was stiff at the hip joint, (anchylosed), and shorter than the other. You will have no difficulty, if you examine this skull carefully, in determining which was the lame side. Which do you suppose, from what you now see of the skull? You are right; even at this distance you can easily perceive that the left hemisphere is more strongly developed at the basis than the right, and, consequently, that the right side of the body had a very great preponderance.

You may even perceive, in looking at the basis of a skull

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\* This is my impression; I have no positive memoranda of the date.

internally, that the digital impressions of the convolutions are stronger on one side than on the other. A good observer will often perceive that the superiority of the left hemisphere is indicated at every point; that the occiput is deeper and more prominent; that the whole middle lobe has a deeper development, and has more strongly impressed the surface of the temporal and sphenoid bones; that the fossa of the occipital bone (extending from the *foramen magnum* to the clinoid processes), which receives the *medulla oblongata*, has a rather one-sided development; that the *foramen magnum* is not strictly symmetrical, and that the petrous portion of the temporal bone extends its posterior surface farther from the median line on the left side, to give room for expansion of the cerebellum and blood-vessels of the left encephalon.

But while the basilar developments are stronger on the left side of the head, it is not so with the moral organs. The right side of the brain and the left side of the body seem to have a gentler and more effeminate character. The right body and left brain have a stronger and more masculine character. We will frequently observe, that the moral organs of the right hemisphere are as full as those of the left, if not fuller, although the antagonist basilar organs are more moderate. Hence the preponderance of moral sentiment in the right hemisphere will often be very decided, and the moral influences may be considered more potent on the left side of the body, as the physical are on the right.

We may observe, incidentally, that the liver lies chiefly on the right side of the body, and the heart on the left; that the former is associated by popular phraseology with the ill-tempered and depressing passions, and that the latter has, from time immemorial, been regarded as particularly connected with our emotions and sentiments.

One of the most remarkable instances of disparity of the hemispheres that I have known, was that of a woman living upon the banks of the Red River, Louisiana, in whom both brain and body were very differently developed on the right and left sides. I found her right cerebral hemisphere singularly smaller in the occiput, higher in the coronal, and less developed in the temporal region. Upon inquiry, I found that the left side of her person was as much inferior in vigor, health, and development as this disparity indicated; that her left eye was weaker than her right, that the whole left side of her body was more feeble and sensitive, and that she felt a great deal of pain on that side. Observing the disparity of the hemispheres in the upper occipital region, near the crown of the head, I requested her to raise her arms alternately aloft as high as she could. The right arm she raised with the ordinary freedom of movement in females, but the left she could scarcely move above a horizontal position. At the age of thirteen she had had a severe attack of illness, resulting in a pain in the left side, from which she had often suffered and was suffering then. Thus the frequent

suffering from disease, and the inferior exercise of the left half of the body, produced ultimately a signal difference in the hemispheres. If the two sides of her head had been separately examined, they would have indicated materially different characters; there being a much stronger development of the organs which give strength, health, and force of character on the left side of the head, and a better development for patient, unselfish endurance, and amiability of character on the right.

Some such difference being general, we find, that in making the sympathetic diagnosis, the subject receives a much stronger impression from the left hemisphere or right body than from their opposites. Still, there must be a limit to this inequality, and when we examine the laws of co-operation between the hemispheres, you will perceive that they are so connected by the circulation of blood, and by certain organic laws, as to influence and modify each other in every cerebral act. There is, then, a limit to this disparity, or rather an influence which continually tends to preserve cerebral equality.

It is indispensable, to bear these principles in mind during our medical and philosophical experiments. Each hemisphere must be touched, and in corresponding points, to produce the best effect. Touching one hemisphere alone, will not produce equal effects on the two sides of the body. In some, the connection of the hemispheres is very intimate, and excitement is rapidly propagated from one side to the other, so as to produce an equilibrium; but in others you may easily destroy this harmony, and produce discordant results on the two sides. An important case, in point, was mentioned in my lecture on Impressibility: the case of a lady in whom sleep might be imparted to one side of the body and wakefulness to the other, when she attempted the examination of those organs by touch and sympathy. She felt an influence on each side independently, as if there were no common center of perception; as if her individuality had been divided, and she enacted a double character.

The constitutions of some persons admit of the most opposite experiments being made upon the two sides of the body at the same moment, without their results commingling into any one general effect. But the general tendency, in those who have not been mesmerized, being toward unity, these discordant experiments will not be agreeable in their influence if carried far.

Some of these experiments afford us the best methods of illustrating Neurology to a learner. For example; by touching here, upon the organ of Relaxation, about an inch below the left cheek bone, we weaken the right arm; or, by touching on the right cheek we weaken the left arm, (see diagram); we may even weaken the right arm, by touching the left organ of Relaxation, while by touching the right organ of Energy we strengthen the left, so as to make the left arm actually stronger than the right. I have sometimes carried this so far, that when the right could not even support itself, the

left arm had all the former strength of the right. To produce the most complete effect, stand behind the impressible person; on the right side of his head touch the regions of Energy and Vitality, on the left side, the region of Relaxation, and any of the organs in the department of Weakness, from Relaxation upward. You will find that, after a time, he has become almost left-handed. The left side seems to have absorbed all the energy of the system, leaving the right side relaxed and powerless. I have sometimes left my subjects in this condition, and found that it would remain many hours. I have no doubt, that a regular succession of such experiments, renewed as often as might be necessary to keep up the impression, would destroy dextrality, and make a permanently left-handed man. When the muscular energy has been transferred to the left side he is actually left-handed, minus the education necessary to give the best use of the left arm, but as it is then in a good condition for use, this education or facility could easily be acquired.

If we would operate upon the senses, the same law of decussation will be our guide. Let us test the comparative acuteness of the senses of touch and feeling in the right and left hands, so as to be satisfied of their natural equality or inequality, before we change this relation. If we touch the organs of Sensibility in the right hemisphere, while on the left we rapidly disperse the excitement backward from that organ, we will perceive that the right hand has become comparatively insensible to blows, while the left is unable to bear any pain; and that a piece of cloth, which feels very harsh or coarse to the sensitive left hand, feels smooth to the right, which is unable to detect the thread or fiber. I have frequently made the experiment in a deceptive manner, by requesting the individual to hold his hands behind him, and judge the texture or fineness of different articles, by each hand separately. The same article (as a handkerchief) being then felt separately, by the right and left hand, he would fancy when he touched it with the left, that it was a very coarse, inferior article, or a towel, and when he touched it with the right, that it was of the finest quality and of a smooth or silken texture. In making the experiment, the hardihood or insensibility of the right hand may be promoted by touching the left organ of Hardihood. The hands being in this unequal condition, we may readily display the inequality by touching a piece of hot metal, or a galvanic circuit.

In operating upon the perceptive organs around the eye, we affect the opposite eye, and not the one near which we are touching. This must be borne in mind, for the eye is generally a sensitive organ in the impressible, and physicians sometimes, by applications upon the forehead near a diseased eye, will injure or materially influence the opposite eye. When you thus affect the eyes by means of the organs of Light, Shade, and Somnolence, you may sometimes hear the suggestion, that the effect was produced by a pressure upon the nerves or blood-vessels near the eye. This is a triple absurdity;

for, firstly, there are no such nerves or blood-vessels there, capable of so influencing the eyes, as any one, not impressible, may satisfy himself by pressing with all his strength upon the spots alluded to; secondly, we do not press or produce anything more than mere contact, and not always that; thirdly, the eye near which we touch is not affected by this touch, but the opposite eye.

If we would endeavor to produce different conditions in the eyes, we shall find that the organ of Light, immediately over the pupil, adapts the eye to vision in a bright light, and gives it strength; but that Shade makes the eye intolerant of light, and the organ of Optic Sensibility produces a delicate and irritable sensibility to light, somewhat similar to that of Shade, both tending to close the eye, as Light tends to keep it open.

We may produce conditions so entirely opposite upon the two sides of the body, that they seem to have little affinity. "To follow my inclination, (said Dr. L., after I had thus experimented upon his head), *this* side would get up and walk off; but *this* would lie down there on the floor." If we would perceive contradictory emotions excited on the two sides, it is best to use the eyes separately. Thus, when you touch the organs of the left hemisphere, let the subject look out with the right eye. The appearance of all objects is modified by our feelings; the world is bright or gloomy, and the same person amiable or disgusting, according to the tone of our own feelings. Sometimes, when I excite the region of Hope, the subject asks me if it is not actually brighter—if the sun has not come out from behind a cloud during the experiment. If we excite Hope in the left hemisphere, and Despair in the right, the subject will perceive that to his right eye, when used alone, all objects are brighter and more pleasing than to his left. If friendly organs are excited in the left hemisphere, and hostile feelings in the right, the right eye will be more easily pleased, and will perceive a benignant, attractive, or prepossessing appearance in the countenance of any one who approaches; but the left eye will see everybody surly, ugly, sinister in expression, and offensive in manners. A lady, who repelled her husband, and refused to permit him to approach on the right side, received him kindly, as usual, when he approached on the left side, her right eye being closed. Her left occipital organs had been excited so as to produce this repulsive feeling.

Having ascertained the facts of decussation by experiment, we are tempted to inquire what is the final cause, what is the object of this arrangement, and why the hemispheres do not connect directly, each with its own side of the body?

The ultimate object of this decussation is cerebral unity. In the actual crossing of the fibers there may be some connections or sympathies established by the mere fact of contiguity, and mingling of fibers, but as each tract of fibers is independent and continuous, without anastomosis with its neighbors, this connection is probably not very important.

The sympathy and similarity of the hemispheres is maintained against all divellent forces, by a reciprocal influence through the circulation, which can be exerted only by means of this decussation. Each hemisphere has the control of the half of the body with which it is connected; but as each, by means of the decussation, controls the opposite half of the person, it consequently controls the opposite hemisphere. This control is over the muscular system, the secretions, and the circulation. The left hemisphere thus controls the circulation of the right hemisphere, and thereby determines which of its organs shall have a preponderant activity; for the action of all parts of our frame is controlled by the circulation; deprived of blood they languish, and stimulated by arterial blood they enjoy a vigorous life. Whatever excitement may be produced in the left hemisphere, must have its influence over the circulation immediately, and thus generate a state of excitement, or a balance of power in the opposite hemisphere, similar to that of its cause.

Thus whatever excitement may be manifested by one hemisphere, will be echoed by the other, the secondary excitement being, in all cases, in exact correspondence with the primitive action of the other hemisphere. Thus the two hemispheres of the cerebrum, which I have already shown to have relatively a masculine and a feminine character, sustain to each other in action the same relation which exists in a harmonious family, where a perfect marriage has thoroughly united husband and wife. The will of each is influential upon the other, and generates a corresponding will or desire. Thus the perpetual echoing unison of concordant and co-operative volitions, constitutes the perfect harmony and happiness of a true union; and, in like manner, the decussation at the bottom of the encephalon connects, as by an anatomical marriage, the right and left cerebral hemispheres, enabling each to exert an influence over the wishes of the other, and to sympathize with all its conditions.

The matrimonial analogy goes even further than this, for the family includes not only the husband and wife, but their subordinate offspring; so the encephalon includes not only the right and left cerebrum, but the subordinate cerebellum, (which is the source of offspring). The cerebellum, which has not the commanding rank, or volitional power, or intellect of the cerebrum, has, nevertheless, a remarkable resemblance or coincidence with it in certain features of its structure, that I shall point out hereafter. The results of pathology appear to indicate, that the cerebellum does not enjoy the anatomical marriage of decussation, in its relations to the body; on the contrary, it would appear, in reference to decussation, to act a subordinate part, as a portion of the body in reference to the cerebrum, not as a portion of the encephalon in relation to the body. The ultimate philosophy of the decussation and co-operation of the hemispheres, is a beautiful mathematical problem, which becomes perfectly simple when we have surveyed the pathognomic relations of the brain to the muscular system.

## ART. IV.—MESMERISM IN INDIA.

BY JAMES ESDAILE, M. D.

CHAPTER IV.—(CONTINUED FROM PAGE 440.)

I MAY also here notice a similar instance which occurred to my brother, a clergyman in Scotland. I give it in his own words:—"Returning to London, after a tedious and dangerous voyage from the continent, I retired to bed shortly after reaching my hotel. I had taken possession of a spacious apartment, in which were two beds, of which only one was occupied. I soon fell asleep, as I thought, but in a short time left my bed, and wandered about in the greatest perplexity, under the idea that I was still on board the foreign steamer, which I had recently left. I went from berth to berth, as I conceived, beseeching all and sundry to show me my own berth. At last I came in contact with the empty bed, and creeping over it, got embayed between it and the wall. I was long of getting out of this new dilemma, and resuming my supplications to the numerous sleepers by whom I fancied myself surrounded. I remember well one part of the affair, which filled me with the greatest trepidation. I came up to a small table, on which I distinctly heard a watch ticking. The idea came into my head that should the owner awake, and find me in such suspicious proximity to his watch, he would denounce me as a thief. I spoke long and eloquently, rebutting the base suspicion, but the sleeper remaining unmoved; I paced about in despair. I came to the door, but having locked it, it did not yield to my attempt at opening; but on coming to the window, I drew up the blind, and was still more bewildered on seeing the mighty mass of London spread out before me. The light of the moon, however, striking on the watch, was at last the means of restoring me to the full use of my senses. It suddenly occurred to me that the watch was my own. I instantly seized it, and forthwith was wide awake. I was in the middle of the room, and in a cold sweat. A considerable time must have elapsed, during the occurrences above described, and the curious thing is, that my eyes were wide open the whole time. I spoke only French, and that with the greatest volubility."

*Mesmeric Sleep-waking.*—The following is a beautiful example of the same condition of mind, produced by art:

Mrs. ———, an English lady, wished to be entranced, to have a tooth taken out by the dentist, who was shortly expected to arrive. I told her husband, that my labor would be in vain, if she thought advantage was going to be taken of her sleep; fear and

anxiety being quite destructive to the production of coma; and suggested that when the dentist arrived, I should then propose to make a preliminary experiment, telling her, that if it succeeded she could then suit her convenience, and be entranced at any time to have the tooth taken out.

The dentist came, and his arrival being carefully concealed from the lady, I proposed to test her powers of submission. At the end of half an hour, her arms appearing cataleptic, I desired her husband to order the carriage, and go for the dentist. In a quarter of an hour they arrived, and I bent back the lady's head, and began to open her mouth without any attempt at resistance; but, on the window being thrown open to give the dentist light, she awoke with a sudden start, and said the dentist was present. She thus described her feelings: she very soon became unconscious, after feeling a general sense of warmth and oppression on the chest; she felt me raise her arms, and leave them in the air without the power to move them, but did not hear me desire her husband to get the carriage ready. She heard the carriage wheels, however, and then it flashed across her brain that her husband had gone to bring the dentist, (although she firmly believed him to be in Calcutta), and this conviction from that minute, took complete possession of her mind. She greatly wished to call back her husband, or to get up and run, but she could not move tongue or foot, and showed all the time the most perfect repose of body and feature. She heard the carriage return, and knew it brought the dreaded dentist; was sure it was he who was speaking to her husband, and yet remained fixed to her seat, like a statue. In this instance, the sense of hearing was the only means of communication with the outward world, but it excited a former train of ideas; and how accurately did fear and causality come to a right conclusion, from the ear having transmitted a suspicious sound!

This case opened out to me the nature of Somnambulism, and taught me how to make somnambulists.

*Dreaming of the Organs of Sentiment and Intellect.* — Perhaps no demand is made on the organs of sense; but the waking parts of the brain are those connected with the passions, feelings, hopes, and fears of the individual. The imagination becomes inflamed by sympathy with the excited organ, and the most vivid sensations of pain or pleasure, ecstasy and agony, are excited, according to the organ stimulated, and they control, more or less of the reflecting power. The lover, the miser, the philanthropist, and the murderer; the man who hopes for coming good fortune, and he who lives in constant dread of coming evil; all enjoy, or torment, themselves to a height of pleasure, or horror, that cannot be felt when awake. If the reflecting organs are chiefly called into play, then the man of business does a stroke in trade, or conceives a capital speculation that might be of use to him, if he could recollect it when awake; the student easily conquers his difficulties; the



mathematician solves the problem, and the historian removes a doubt; the poet's thoughts and lines no longer leave his brain like bird-lime, but he pours forth his soul "in thoughts that breathe, and words that burn." All good dreamers, in fact, confess that they think, say and do better things when asleep than when awake. Or, let us suppose that the reflecting organs have been intensely engaged during the day, in considering our proper course of action in certain circumstances, and the probable consequences, or that a craving to penetrate the future has been the haunting idea; then the judgment, undisturbed by external impressions, and undistracted by passion, self-interest, and routine habits of thought, and supplied by memory only with the past experience and knowledge that bear upon the question; under these circumstances it is imaginable that the mind may jump to just conclusions, and receive a clear and happy glimpse into futurity. These impressions, when remembered on waking, and verified by subsequent events, are naturally converted into inspired dreams, and supernatural warnings, merely by the train of reasoning having been lost. The persons, in reality, have reasoned correctly, but by an unusual mode, whose processes have been forgotten; and have penetrated the future, only by comparing it with the past. In this way

"Old experience may attain  
To something like prophetic strain."

And such dreams being remembered, and the reasoning analysed, may be of real use to us, in shaping the course of our present and future conduct, because our sleeping conclusions have been come to from just premises, and the natural process of connecting cause and effect: whether this is done sleeping or waking, is of little consequence, the results being equally correct.

If the state of one's health has intensely occupied the thoughts, and the hope of being cured of some distressing complaint is the leading idea; then the man of medical and physical knowledge may possibly hit on the precise nature of his disease in dreaming, and prescribe for its cure in sleep better than he could have done by waking reflection; and, perhaps, the animal instinct of self-preservation may be concentrated on the case, and suggest a course of proceeding, the *rationale* of which we do not understand, but which yet may benefit the patient if acted upon; just as morbid longings, as we call them, (though frequently they are promptings of nature, and ought never to be despised by the physician), often do the system good, when yielded to and gratified: this is called dreaming of what will do one good.

*Mesmeric Dreaming of Different Organs.*—As in natural sleep the organs are often preternaturally excited, and their powers singularly increased, by the concentration of the nervous energy upon them; so, in the mesmeric sleep, this may be effected, and of course

to a greater and more wonderful extent, by the person being under the control of a reflecting and directing agent, instead of being left to the fitful lights of his own imagination, and the short unsustained flights of his intellect, as in common dreaming. This power of acting on separate portions of the brain, and thereby inducing such trains of thought as we may be pleased to excite, will perhaps be found of practical utility in the treatment of mental diseases; the diseased haunting idea might be banished, and a more healthy tone of feeling and reasoning substituted and sustained, until a new and better habit of mind was produced. I see no reason to doubt that the mental organs can be isolated and exalted by the mesmeric influence under the direction of a skillful leader and suggester, and can readily believe that the mind, by this artificial stimulus, may be excited into more vigorous activity than when acted upon by the usual conditions of life. If persons may derive benefit from night thoughts in dreams, their sleep-waking day thoughts should be more valuable; but the one has no more pretensions to supernatural power than the other. The night-dream is woven out of past impressions lighted up by a flickering imagination and a wavering judgment; and the somnambulist has only the advantage of having his thoughts sustained and concentrated by his mental director. Nor, considering the excessive nervous delicacy developed in the course of mesmeric treatment, and the power of fixing the whole attention upon their bodily sensations, do I think it impossible that somnambulists may acquire an instinctive perception of the condition of their organs, and occasionally be able to prescribe something for their relief; just as persons dream, under nearly an analogous state, of what will do them good, and which sometimes really does so. My psychological experiments have been very limited, partly, because I feared to bewilder myself at the outset, and also from want of proper subjects to try them on. The mental range of my patients is so circumscribed, that the topics of food, drink, and clothing, almost exhaust it, and with most of them I have no common language. But I have done enough to show me how the higher grades of somnambulism may be reached; and with more highly organized and intellectual natures, I should have good hopes of doing so.

If properly set about, somnambulism may be produced at a very early stage of the mesmeric phasis, or can be developed as the first step in the return to life from the mesmeric trance; but in the latter case, the sleeper is apt to wake up, at once, to perfect consciousness. To make the simple somnambulist, it is only necessary to operate on the person until his arms become cataleptic; all expression then vanishes, and even when the person answers on subjects of deep interest to himself, no sign of mental emotion ever disturbs his countenance. The statue-like serenity of features may be singularly broken by concentrating his attention, and desiring him to do whatever you do: he then becomes an imitative automaton, mimick-

ing most servilely, and exactly, the actions and words of the mesmerist, or any one substituted for him, and who attracts his attention. Even at this stage, I have not established any "rapport" between the parties, but have only desired the person who took my place to call upon the somnambulist repeatedly by name, until he answered, and then to give clear and short orders, which were obeyed as readily as my own. There is much misapprehension prevalent, I am convinced, about the necessity of "rapport" in the physical and lower mental phenomena of Mesmerism: most of my experiments have been made on patients first entranced by my assistants, and my subsequent control over their movements was often acquired without touching them; it being only necessary for me to attract their exclusive attention.

July 29th.—I made a man senseless and cataleptic, at a great distance, in the presence of a large number of gentlemen, who had come from Calcutta and elsewhere;\* among them were six doctors, in whose hands, and in those of the rest of the company, he was left as long as they pleased, without my approaching, until I was requested to awake him, after they had all tried in vain. This I did, but only to the extent of enabling him to walk and follow me. I then said, that I would try to clear up his perceptive organs sufficiently to permit him to understand my wishes, with which he would implicitly comply; I did not wish to leave him the power of speech even, at this stage. Having attracted his ear, I ordered him to do what I did, and this he very faithfully performed by throwing himself, on the instant, into every attitude I assumed; but I required to be careful, for if I threw him much out of balance, he was in danger of plunging head foremost against the floor. Those who did not see him, may imagine how little the poor fellow knew what he was about, when they were told, that he took the "longitude" of the judges of the Supreme Court with the cool impudence and precision of a cabman, and the gravity of an astronomer. I then proceeded to free his voice, but only to the extent of making him my echo: he was told to repeat whatever I said, and he showed his intelligence by *repeating the order*. He then gave us "Ye mariners of England," and if the pronunciation was not very perfect, he seemed to me to reverberate exactly my tones, and my gesticulations were also faithfully copied. We passed suddenly from "grave to gay," and he did such justice to "Hey diddle. diddle,"

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\* I take the liberty to give the names of such gentlemen as I know, or who were introduced to me; not, however, as being all vouchers for the truth of Mesmerism, for I did not know many of them, and know not the effect produced on their minds by what they saw. There were upward of 60 persons present, and some will be found, I hope, to put me right, if I misrepresent, or incorrectly report, what every one saw. Messrs. Barlow and Tucker, Judges of the Sudder Court; Mr. Elliot, Law Commissioner; Mr. Hardinge, Capt. Hardinge, Mr. Melville, Mr. Larpent, Mr. Bayley, Mr. Wanchope, Mr. Jackson, Mr. Graves, Mr. Clermont, Mr. Betts, the Rev. H. Fisher, the Rev. F. Fisher, the Rev. Mr. Bradbury, Mr. Hunter, Mr. Bennett, Major Wood, Major Anderson, Major Riddell, Capt. Duncan, Capt. Cantley, Dr. McPherson, Dr. Smith, Dr. Burt, Dr. Walker, Dr. Elton, Dr. Ross.

that I lost my gravity and burst into a laugh; he joined me in full chorus, and I heard it remarked "he can't help laughing himself;" and some were now quite satisfied that he was found out! upon this, I stopped laughing, and, on the instant, his features relapsed into the most awful repose, and I pointed out that it was no joke to him, but purely imitative laughter, and this, I should think, became evident to all. He also sang "God save the Queen" as well, or rather as badly as I, for he is capable of much better things, under a more skillful music master. I now awoke him up a little more, and made him capable of answering questions: he was asked if he could fence; he said that he could; and I bid him show me. He began to cut the preliminary capers of the native fencers, but, in the act of stooping, a fit of rigidity shot through him, and he would have fallen with dangerous violence against the floor, if his fall had not been fortunately broken. I am always alarmed, and on the look out, when this man is experimented on, from this tendency to instantaneous rigidity of the body. A profound trance, from which it is very difficult to awake him, succeeds such exertions, and usually lasts for four or five hours. I showed another step in the mental phenomena, on other subjects; enabling them to answer simple questions correctly, and extinguishing and releasing the power at pleasure. All reflection being dormant, they feel a natural impulse to give a direct answer to a direct question, and in this way tell me frankly whatever I choose to ask. We are assured that common sleepers can also be played upon in the same way by patient and skillful persons, and that this is well known to the secret police of France.

*Catalepsy.*—The following is a medical description of natural catalepsy, from the *Cyclopædia of Practical Medicine*. "The attack is generally instantaneous, the sudden rigidity of the trunk and limbs, the suspension of the senses, and temporary interruption of the exercise of the intellectual faculties, having been preceded by no premonitory stage. The patient retains the posture of body and the expression of countenance which he chanced to have at the moment of seizure; and by this combination of fixed attitude and unvarying expression, presents the air of a statue rather than of an animated being. The eyes continue either fixedly, or shut, as they happened to be at the commencement, while the pupil, though usually dilated, contracts on the approach of a strong light. The balance between the flexor and extensor muscles is so perfect, that any new position given to the head, trunk, or extremities, by an external force is easily received and steadily maintained. This passive energy of the muscular system, permitting the body to be molded into almost as great a variety of attitudes as if it were a figure of wax or lead, is the distinguishing characteristic of the disease."

*Mesmeric Catalepsy.*—Sept. 24th—Mr. Blyth, curator of the Asiatic Society's Museum, paid me a visit yesterday, and saw various mesmeric operations in my hospitals. He begged so earnestly

to be allowed to see a somnambulist that I was over-persuaded to gratify him, as I wished to confine myself to the purely medical relations of Mesmerism. I told him, that when the mesmeric influence, or rather disease, had been deeply felt by the constitution, any body could re-develop it very easily, and that if he would follow my directions, he might mesmerize a man for himself, and convert him into a somnambulist afterward.

He accordingly rendered a man senseless, standing erect, in a few minutes, and failing to awake him, requested me to do so, which was instantaneously done. But, as often happens, when the system is deeply affected, he fell back into the trance, and Mr. B. begged to see the imitative stage of somnambulism. I said, he could do this also himself, by concentrating the patient's attention. Mr. B. was sitting on a table a few yards in front of the man, and made all kinds of noises, which he echoed back. Wishing to examine him more closely, Mr. B. jumped off the table, and came running forward with his body bent, and singing. The man did exactly the same, but a sudden fit of rigidity passed through him, and he plunged head foremost against the floor, to Mr. B.'s great distress. I had him placed on a comfortable bed to sleep off the effects, and we left him at 1 o'clock, P. M.

I was painfully startled to find the man as stiff as a log to-day, at 11 o'clock, and that he had shown no signs of life since we left him.

This would not have alarmed me without the accident, But I feared the head might have been injured by his fall, and set about restoring him to his senses, by the usual mesmeric processes, but all in vain. I then had recourse to volatile stimulants to the nose (I could not induce any attempt to swallow), and effusion of cold water on the body, and to water poured from a height into his open eyes; but to no purpose. I returned in an hour, and renewed my efforts; no fluid could be got to pass down his throat, it ran out of his mouth as from a dead man's; while looking on attentively, I saw an instinctive effort made to clear the wind-pipe of mucus that obstructed it, and then an attempt to swallow; I took advantage of this, and poured some water down his throat; some, luckily, for my purpose, passed into his wind-pipe, and brought on a violent fit of spasmodic coughing. I continued to rouse the system at the same time, by every possible means, and succeeded in awaking him. But from the rigidity of the muscles of respiration continuing, his efforts to get rid of the water, and the accumulated mucus of twenty four hours, nearly choked him. At length, the respiratory muscles resumed their natural action and enabled him to eject the phlegm from his wind-pipe.

After the trunk had become pliable, his legs remained as rigid as bars of iron, and could not be bent for half an hour afterward.

This will not only be a lesson to myself, but to others, I hope; and, in future, I must resist all application to do more than is ne-

cessary for the removal of disease, even at the expense of being thought uncourteous and disobliging.

*Coma.*—"Last stage of all in this strange, eventful history," is only separated from the chamber of death by a very fine partition. In this, mind and body are equally torpid, and insensible to all external impressions. It is seen in persons exhausted by long watching and fatigue, exposure to cold, or intense suffering of body and mind; and in this condition of the nervous system surgical operations might often be performed without causing pain. Irregularity in the vital organs, anguish and misery of the countenance, characterize natural coma, and indicate that the icy hand of death is arresting the currents of life, and, in general, the last trump alone can rouse the sleeper from this torpor of exhaustion.

*Mesmeric Coma.*—In this, the great organic functions are usually undisturbed; the countenance is calm and full, and the complexion that of health. The person is generally easily aroused, and how different is his waking! In an instant, often, he returns to full life and consciousness, without knowing that he has been asleep, and his feelings are often those of pleasure and relief; if he has lain down in pain, he often awakes free from it, and renovated in strength and spirits. In the subsequent part of this work, abundant instances will be given of this, and I will only here introduce one.

May 22d.—I went to-day to see my patient Mr. Clermont, head master of Hooghly College; but found that he had gone out to his duty. Mrs. Clermont mentioned, that she was suffering from one of her nervous headaches, which commence with a pain in the back of the neck, that spreads over the scalp, and around the eye-brows; she has been weakly and nervous of late. She knew nothing about Mesmerism, and I had never mentioned it to her, but now proposed to try the effect of it on her complaint. No objection being made, I requested her to turn her back to me, and sit erect in her chair, and describe anything uncommon she might feel during the process.

After a few minutes, she said that she felt a warmth in the neck, and on extending my manipulations, it advanced to the scalp and eyes. In about eight minutes, she said that the pain was much less, and that she felt very drowsy: upon which, I asked, "shall I put you to sleep?" She only smiled in reply, raised her right arm, put her hand to the side of her head, and went to sleep. At this moment a lady (Mr. Clermont's sister,) entered the room, and I begged her to remain by Mrs. Clermont until I returned with her husband. Having found him, I asked pardon for taking the liberty of mesmerizing his wife without his consent, and requested him to return to see her awake. We found her as I had left her, with some members of the family looking on. I extended her arm at a right angle to her body, in which position, or any other, it remained fixed until moved again, and her sister-in-law pricked her hand unheeded. As I saw the party becoming uneasy, I awoke her, but with considerable difficulty: she felt very much ashamed at having been found

asleep by me, as she supposed, and it was only after long questioning and reflection that she recalled the circumstances attending her sleep. The headache was quite gone, and she felt, and looked, greatly refreshed.

[Mr. Clermont confirms the above in a letter, and says she has been doing well ever since.—Ed.]

*Natural Clairvoyance.*—This is recorded to have been seen in cases of natural catalepsy, and a French physician, M. Petetin, has related several instances of it, which are as well attested as most facts in the history of medicine. M. Petetin had opposed Mesmerism, when alive, and the cases of catalepsy, in which he had observed a transference of the senses, were found among his posthumous papers, and published after his death. In the first case, the discovery was purely accidental: a cataleptic patient was seized with an uncontrollable impulse to sing, which nothing could stop, as she was completely deaf and insensible to external impressions on the organs of sense.

M. Petetin fell by accident across the bed, and when his mouth was near the patient's stomach, exclaimed in despair, "Good God! what a pity that this woman can't be stopped singing!" This exclamation the woman heard, and answered, to his great amazement, and they continued to converse through the pit of her stomach, and the functions of the other senses were also performed by remote parts of the body. All this is supported by unexceptionable authority; such as one cannot reject, and hope to be himself believed.

It has also been seen and described by unprofessional persons of intelligence and veracity; of which the following is a curious example: it is a communication from a clergyman to Sir George McKenzie, President of the Edinburgh Phrenological Society, and was written without any reference to Mesmerism, and before it had attracted any attention in England:

"DEAR SIR,—It is perfectly true, that our poor friend, who has now been some months with us, presents one of those singular and almost incredible cases of hysterical or nervous affection, which are at distant intervals witnessed under the dispensation of the Almighty. The overthrow of the regular functions of the nervous system was occasioned by the almost sudden death of her father (to whom she was fondly attached), who was seized with illness, during her absence from him, and died in a few hours after she returned to her home. I cannot enter into any longer details of the case, which has been attended with all those varieties, which have long characterized the complaint among medical men as the Protean disorder. The extraordinary powers communicated to the other senses by the temporary suspension of one or two of them, are beyond credibility to all those who do not witness it: and I really seldom enter into any of the details, because it would be but reasonable, that those who have not seen should doubt the reality of them.

"All colors she can distinguish with the greatest correctness by night or by day, whether presented to her on cloth, silk, muslin, wax, or even glass; and this I may safely say, as easily on any part of the body as with the hands, although, of course, the ordinary routine of such an exhibition of power takes place with the hands,—the other being that of mere curiosity. Her delicacy of mind, and high tone of religious feeling, are such, that she has the greatest objection to make that which she regards in the light of a heavy affliction from God, a matter of show or curiosity to others, although to ourselves, of course, all these unusual extravagances of nervous sensibility are manifest, for at least twelve out of every twenty-four hours. She can not only read with the greatest rapidity any writing that is legible to us, music, &c., with the mere passing of her fingers over it, whether in a dark or a light room (for her sight is for the most part suspended, when under the influence of the attack, or paroxysm, although she is perfectly sensible,—nay, more acute and clever than in her natural state); but within this month past she has been able to collect the contents of any printing or MS., by merely laying the hand on the page, without tracing the lines or letters; and I saw her, last night only, declare the contents of a note just brought through the room, in this way (when I could not decipher it myself, without a candle), and with a rapidity with which I could not have read it by daylight. I have seen her develop hand-writing by the application of a note to the back of her hand, neck, or foot; and she can do it at any time. There is nothing unnatural in this, for, of course, the nervous susceptibility extends all over the surface of the body, but use and habit cause us to limit its power more to the fingers. Many, even Medical men, take upon themselves to declare, that we are all, her medical attendants as well, under a mere delusion. We ask none to believe anything, if they prefer not to do so, and only reply,—The case is equally marvelous either way; either that this our poor patient should be thus afflicted, or that eighteen or nineteen persons of my family and friends, in the daily habit of seeing her, should fancy she is, for every twelve hours out of the twenty-four, doing at intervals that which she is not doing. There are many exhibitions of extravagant powers which she possesses, that we talk of to no one; for, finding it difficult to acquire credit for lesser things, we do not venture on the greater. Her power ceases the moment the attack passes off. A considerable swelling has at times been visible at the back of the head, which has yielded to the treatment. It is certainly a case which would be an instructive one, in the consideration of the physiology of the human frame: but she, poor thing! is most averse to experiments being purposely made on her; but in her every-day life among us, we have no lack of proof for all we believe and know.

"Between the attacks, she is as perfectly in a natural state as ever she was in her life. There is but one paradox in her state;



and that is, that she can, at such times, hear some sounds, and not others, though very much louder, and see some things, and not others, though placed before her. She could hear a tune whistled, when she could not hear a gun fired close to her. It is certainly the absorption or absence of mind that occasions this; absent to some things, though present to others, like any absent man; and thus Dr. Y. accounts for it. In making this communication to you, in part to vindicate the testimony of my friend, Mr. M., I have really exceeded my usual custom and resolution; for I do not think it fair to the poor sufferer herself, to make her too much the talk of others. Very few believe what we tell them, and therefore we are in no degree anxious to open our lips on the subject. All I know is, that I should not have believed it myself, had I been only told it. I must beg, that you will not make any undue use of this communication, by handing my letter about to any one. The friend for whom you ask the information is perfectly welcome to read it, or I should not have written it. If the case were my own, the world should be welcome to it; but a young female of such sensibility might be much embarrassed by finding the world at large in possession of all particulars on her recovery, should God so please to permit.

“I am, &c., &c., ————.”

*Mesmeric Clairvoyance.*—If the above are facts (and it is no sign of credulity to believe them until they are refuted, which has never been done, I believe), I think it extremely probable that art, having copied nature so far, can also imitate her in this; and that clairvoyance has actually been produced in the derangement of the nervous system caused by Mesmerism. It has not yet occurred in my experience, but I should not at all be surprised to encounter it. A gentleman who saw me amputate a tumor, 28lbs. weight, the other day, and cut and rudely handle the most delicate parts of the human body for twenty minutes without the patient showing a sign of life, said at the conclusion, “Well! I have learned one thing to-day, and that is—never to be again *positive* about anything: I did not believe a word of it, and am now completely convinced of its truth;” and those who wish to know the truth about Mesmerism will do well to follow his example.

Would the most imaginative of my readers ever think the following process as a likely means to make people insensible to fire and steel; by the effect produced on the imagination? A Bengal cooly, or pariah, comes before me for the first time, and I see he has a disease requiring a surgical operation; I never say a word to him, but desire my assistants to take him to another room and mesmerize him. They desire him to lie down, shut his eyes, and try to sleep, and they pass their hands slowly over the most sensitive parts of the body; exhaling their breath upon the patient, and loading him with their sweat, if he does not readily yield to the mesmeric influence. A few minutes of this will sometimes suffice, but

more generally it takes hours, and relays of mesmerizers; and a less imaginative process I cannot imagine.

I suspect, however, that considerable error exists regarding the power of the *will* in producing the *physical* mesmeric phenomena. People are *willed* to sleep, I believe, by directing our nervous influence upon them, and simply making them the objects of our attention, which is sufficient to impel this influence against them, and, if they have become extremely sensitive to the impression, the usual specific effects will ensue, and they appear to go to sleep in obedience to our will that they should. I have tested this in a variety of ways, by desiring Hindoos, Mussulmans, and Europeans of all professions, merely to concentrate their attention upon certain highly sensitive patients; and the results were as striking and certain as if the most energetic will had been directed against them. On one memorable and ludicrous occasion, I induced a learned brother (who came purposely to expose the "humbug") to give me the command of his person for a short time. The result was, I forced him, *against his will*, and "in spite of his teeth," to produce all the mesmeric symptoms, from the quivering of an eyelid, to the most intense coma, in subjects of morbid sensitiveness, in whom the tendency to mesmeric action had become a deep-rooted disease.

Nov. 16th.—In the presence of Mr. S. Palmer, Major Smith, Mr. Stopford, and Dr. Scott, I showed the spontaneous development of the mesmeric disease (for such it becomes, if pushed far) in a man who became entranced to the most intense degree, by being merely brought into my presence: every one was left to test his condition, in his own way, and no one doubted the *reality* of his condition. I at last awoke him for them, and carrying him to the end of the room, placed him erect against the wall; in a few minutes he relapsed into the trance, and I catalepted him in the attitude of St. Andrew on the cross. I then mesmerized another man, only, however, to the extent of sealing his eyes, and inducing the cataleptic tendency in the muscles: having set him walking, I extended his arms horizontally, and directed him against the man crucified on the wall. On coming into contact with him, he stopped, and I urged him on, asking, "what stopped him?" He tried in vain to separate his eyelids, in order that he might see the nature of the obstruction, and, having no use of his hands, he thought of helping himself by rubbing his forehead against the object before him: this I stopped by pulling back his head, and it remained stiffened in the position I left it. He was now reduced to utter helplessness, as his feet struck nothing but the wall below: I then blew on his neck, thereby immediately releasing it, and on being again urged to tell what was in his way, he began rubbing his forehead against the man, as before. One arm was next freed in the same way; this he brought into play; then the other, and he used both in feeling and rubbing the man all over, with the greatest earnest-

ness, but without a vestige of expression in his countenance. At length, he said there was a man before him. I also showed, that my breath had no specific effect by doing the same thing with a fan; a current of air being all that was required to dissolve the rigidity of the muscles.

Blowing in the eyes is also the most expeditious way of relieving the brain, and restoring its functions; rubbing the eyes, and pouring water from a height are also efficacious, and sometimes are all needed to de-mesmerize the brain. Air, cold, and friction, are natural stimuli to the skin, and the most likely means to restore its sensibility, if diminished; and I imagine that they relax the muscles by determining again to the surface the nervous currents, which had been thrown back upon the muscular system, and produced its cataleptic condition. I cannot otherwise account for the following singular effects of cold, which, from my patients being naked, I can apply in any way I please. On several occasions, I have entranced persons standing, stripped them naked, and catalepted them in the most painful postures imaginable; and in these they would remain an incredible length of time; but let a little cold water be squirted from a distance on any member, and it became instantly relaxed.—If both arms were fixed perpendicularly in the air, one after the other was shot down instantly, by a slight stream of water; and if it was directed to the calf of the leg, the person fell as if he had been hamstrung: or if the body was catalepted out of the perpendicular, squirting water on the loins would send the patient head foremost against the ground. Blowing on, or rubbing any part had the same effect, but the general torpor is often too deep to exhibit these sensibilities, and such persons are awoke with great difficulty, by the use of all the de-mesmerizing agents.

The respiratory nerves of the face are more particularly sensitive to the impressions of air, cold, and friction; indeed the shock given to a somnambulist by blowing in his face simply, often resembles the effects of an actual blow, and is sufficient to awake him: how, I cannot possibly imagine, unless it be by acting as a relief to the brain, by restoring its secretions to their natural channels.

[This is the true explanation: the conductor organs, located on the face, maintain the communication between the brain and body.—ED. JOUR. MAN.]

Having followed, and imitated, nature so far, in producing different symptoms according to the extent of the nervous derangement we induce, I see nothing more wonderful in the mesmeric phenomena than in the disturbances that occur in the atmosphere, when the electric relations of the earth and air are changed, and the equilibrium for a time destroyed; but we need not, I suspect, seek for this marvelous agent among the great inorganic powers of nature.

## ART. III.—TERRESTRIAL THERMOTICS.\*

BY LIEUT. E. B. HUNT (U. S. CORPS OF ENGINEERS).

[THE following profound and able paper was presented at the second meeting of the American Association for the advancement of Science, held at Cambridge, Mass., Aug., 1849. As a simple, beautiful, and interesting exposition of the early history of the world, when the flowers of summer bloomed over the lands now consigned to the changeless desolation of icebergs and snowdrifts, it cannot fail to interest all readers. The doctrines of this paper would tend to the conclusion that we might possibly reverse the cooling process which has produced our frigid Arctic climates. If the extension of the frigid zone has arisen from the consumption of the elements of the atmosphere—why might not this oxydating process be reversed by decomposition, and the atmosphere again increased in bulk and raised in temperature by the liberation of gases. The decomposition of carbonic acid has been proved by Mr. VAUGHAN. If, in addition to the oxygen supplied from such a source, we could find an adequate source of nitrogen, the ancient atmosphere might possibly be regenerated, and the blessings of agriculture, prosperity, and civilization be carried over the desolate hyperborean regions of America, Asia, and Europe.—EDITOR.]

Few facts are established by more incontestable evidence, than that the temperature at the earth's surface was much higher in its early geological periods than at present. To account for this on established physical principles, and without the use of precarious hypotheses, has not yet been so completely effected, as justly to preclude farther efforts. My present purpose is to state a mode of explanation, which seems to me more based on facts and conformed to Nature, than those hitherto suggested.

If we commence with the alluvial, and return chronologically to the primary formation, we find constant proofs that the earth's original atmosphere has been continually contributing to the solid strata of the terrestrial crust. The aggregate amount thus withdrawn during the immense train of ages since organic life first appeared on the earth, is obviously very great. Oxydations and other chemical combinations, with the ceaseless processes of vegetable and animal nutrition, have been slowly but effectively bearing down the earth's gaseous envelop into its solid masses. The coal measures, especially, present an aggregate of matter originally atmospheric, which if now disengaged and restored to our present atmosphere, would very much increase its total amount or barometric indication. Coal

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\* Thermotics—(from *Thermos*, heat)—the science of caloric.

beds, peat formations, humus or geine, coral reefs, all carboniferous and fossiliferous rocks, have derived portions of their substance from the original atmosphere. If we suppose the history written in the earth's tables of stone to be reversed, until we reach those times, when tropical vegetation grew in circumpolar localities, we shall find the corresponding atmospheric mass much greater than at present, and far more charged with carbonic acid. Whether our present advances in geology permit a moderately accurate estimate of the barometric indications, corresponding to the successive geological epochs, I know not, but a respectable approximation seems not unattainable.

Now the effect of a diminishing atmospheric mass would be a diminishing temperature at the earth's surface. Barometric readings of fifty and thirty inches would correspond to very different temperatures, just as we observe perpetual snow on mountain tops, overlooking plains always temperate or torrid. As we ascend in the atmosphere, the temperature constantly diminishes with the pressure, abstraction being made of all disturbing causes. If we assume an empirical formula, with a barometric variable, to represent the variations of temperature experimentally determined, along a vertical through the present atmosphere, and apply it to the larger and heavier atmosphere of former epochs, the temperature at the earth's surface will be found to augment with the total barometric column, independent of all special hypothesis. It is observable that this increase will be uniform over the earth's surface, while the variable heat due to the sun's local actions must have been always essentially as it now is. Thus the climate of former periods would be more equable and uniformly torrid than at present.

In short, the ancient higher temperature of the earth's surface seems to follow, necessarily, from the simple facts, that the ancient atmosphere was more voluminous and heavy than the present, and that the temperature and pressure vary together. This view by no means conflicts with that of original incandescence, but seems to render it superfluous in this connection. It presents a cause apparently equal to the production of the effect, and free from that hypothetical and accidental character belonging to the theory of progressive cooling from an original fusion. The immense period of time which has elapsed since vegetation commenced on the earth, would seemingly have produced a far greater amount of terrestrial cooling than the observed, if the earth be regarded merely as a heated sphere in a cold space.

A special study of molecular forces and material constitution has presented to my mind the chief facts of terrestrial thermotics, under a beautiful and novel phase. The fact of a constant increase of temperature from the outer limit of the atmosphere to the earth's center, by a rate increasing with the density of the stratum; what Fourier and Poisson call the heat of space; the former higher temperature at the earth's surface; these all follow by mathematical

deduction from a few simple data, already generally accepted, and appear as direct static consequences, or as necessary parts of existing terrestrial equilibrium, not less than the tides or flow of rivers. The primary data are those of Franklin's electrical theory, as corrected by Epinus, and the resulting view of material constitution, somewhat like that presented by Mossotte, though he has failed to notice an important force of repulsion which, on these data, must act between adjacent molecules. In these discussions, the ether of physical optics enters largely; the molecules of bodies being indeed atoms with ether atmospheres, which, in the composition of bodies, rest in those positions of equilibrium which result from the entire action of the primary forces.

Gravitation between separate masses thus appears the resultant of four distinct primary forces, all varying inversely as the square of the distance. These forces are so related, that particles of ether exterior to the earth, are subject to a direct attraction or gravitation toward its center. It will be found that, if the data of Epinus, as used by Mossotte, be true, *ether must be ponderable*; a remark most prolific in consequences, but which I can now only state briefly, and without development.

Ether, being composed of mutually repelling particles, is an elastic fluid, and obeys the established laws of all elastic fluids. Ether and heat, or caloric, I shall regard as identical, having found a range of correspondence so extensive, simple, and uniform, that doubt has gradually vanished before them. The temperature at any point, is the elastic ether tension which would exist in a bulb, containing molecular vacuum when placed at that point. By treating ether or heat as a ponderable elastic fluid, the general facts of thermotics, common and terrestrial, are deductively explained in a simple and beautiful manner. Central heat, for instance, follows as a part of present terrestrial equilibrium, instead of being the residuum of a fusion, existing some myriads of years since, or, as Poisson has imagined, of the absorbed portion of a high heat in a region of space through which the solar system once passed. If we suppose the earth's mass now suddenly cooled to zero in all its parts, its gravitating force would rapidly draw in ether from space, until the present state of things should be restored. That which has been called the heat of space, is fully represented by an ether atmosphere which must exist, if ether be ponderable. This must extend much higher than the aerial atmosphere, blending finally with that stationary ether of space shown to be limitless by the transmission of luminous waves from the fixed stars. Its law of variation in density along a vertical, is transcendental, like that of the air. Now, if the data of Epinus be correct and universal, such an atmosphere must exist: and if it exist, it seems to me intimately connected with auroral, magnetic, and other meteorological phenomena. The currents due to the earth's rotation and translation, through the ether of space, are subjects of interesting speculation.

The ideas that ether is ponderable and identical with heat, seemed at first to conflict with fact, experiment showing no dependence of the weight of bodies on their temperatures. But farther examination showed that the quantity of ether displaced between the most distant temperatures we can command, is but an insensible fraction of the entire amount, entering into the constitution of any mass.—The apparent conflict thus disappears.

The defects and contradictions of the views in physical thermotics, presented by La Place, Fourier, Poisson, Kelland, and others; their marked want of unity in one clear idea of what heat really is; the confessed insufficiency of everything yet presented, to cover the whole ground of facts; and the great importance of arriving at more consistent and tangible conceptions on this widely extended subject, should certainly stimulate a more thorough study of the cardinal features of common and terrestrial thermotics than has yet been made. What is now needed, is a clearer insight into the primary nature of heat. The subject requires the aid of intelligent mathematical investigation, the first step of which must be the assumption of data. Reasoning will soon bring these either into conflict or harmony with established facts, thus disproving or proving their original correctness. The case is not appropriate to simple induction, but demands mathematical deduction from assumed premises. In assuming these premises, the simplest, and those best sustained by analogies and known facts, are most likely to prove true; this prestige belongs eminently to those of Epinus.

Neither should the mind be embarrassed with questionings about the materiality of ether. All that we can know of matter of any kind is, that certain forces act from, on, and in its ultimate units.—This description applies to particles of ether, not less than to platinum atoms, as is shown by their action in luminous undulations and in resisting comets. I have found much gain in coming to a clear, simple conception of a particle of ether; seeing it as a *solid, defined volume, impenetrable, indefinitely smaller than an atom, possessing inertia, being both a source and recipient of incessant, radiant, emanative force.*

A medium, composed of such particles, is highly elastic, and follows all the established laws of elastic fluids; a form of law well known to apply to the conduction of heat. The study of a wide range of special cases and laws, convinces me, that heat, in all its phases and offices, is but this elastic ether, in rest, in flowing motion, or in transmitting undulation. Local temperature simply measures local ether, density, or elastic tension. Heat disengaged by pressure, is ether forced from the molecular atmospheres of the component mass, like water from a sponge. Conduction of heat is the flow of ether among molecules, like wind through a forest or pile of balls. Latent heat is the ether of molecular atmospheres confined by the attraction of the atomic nuclei. Radiant heat is ether transmitted by undulations in an ether medium; light being

ether undulations of a different kind, unattended with actual translation of the vibrating medium.

In brief, by assuming the data of Epinus, exactly as used by Mossotte, we find, first, that a molecule is an atom with an ether atmosphere, very dense at its surface, and its radial decrease of density following a transcendental law. That the various phenomena of material aggregation or constitution admit of clear explanation by the combination of such molecules. That a force of gravitation, or one following the inverse duplicate law of variation with the distance, must always exist between separate masses so constituted. That if we identify heat and ether, the facts and laws of ordinary thermotics find a clear and simple explanation. That ether or heat is subject to gravitation, and that by so considering it, the grand facts of terrestrial thermotics at once result by deduction.

My chief present purpose has been to bring forward for the consideration of geologists, the question as to the aggregate amount of matter now in the earth's crust, which through chemical agencies and the organic cycle, has been withdrawn from the original atmosphere. An approximate determination of the barometric indication on the earth's surface, at the dawn of organic life, if introduced into an appropriate formula of atmospheric temperature, will doubtless show for that epoch, a tropical temperature in polar latitudes. The question stated is simply one of fact, and possesses much interest aside from its proposed application. I may also remark, that the great subject of physical thermotics seems to have been, and to be, too much neglected. Its thorough study now would surely do more to advance rational Meteorology, than the farther accumulation of weather observations without thread or connection. All must confess the great need of general guiding principles in these subjects; a need which can only be met by capturing this subtle fugitive, *heat*, in its obscure fastnesses, and clearly, steadily grasping the clue to its Protean nature. The whole groundwork of physical science is involved in that great problem of material constitution, to the complete solution of which only can we confidently look for full insight into the thousand agencies of heat. This problem is to all the phenomena of inorganic nature, what that of gravitation was to the movements of the Solar System, and must indeed include gravitation itself as a part of its solution. Science has no need so great as a revival of the Newtonian spirit, and could the great "high priest" himself return, he would soon verify the belief expressed in his Principia, that all material nature is a problem in *mechanics*, an exponent of those forces belonging to the ultimate secrets of matter.



## ART. IV.—ELECTRICITY.

At the second meeting of the American Scientific Association, at Cambridge, a paper by Prof. E. Loomis was read, from which the following extracts present some interesting facts, valuable to the anthropologist on account of the important bearing of electricity upon animal life, and its value in the treatment of disease:

"In October, 1842, Mr. Alexander Bain discovered that a plate of zinc buried in the earth, and connected by a wire with a copper-plate similarly buried, at the distance of a mile, produced an electric current with which various electro-magnetic experiments were successfully performed. I have lately performed a series of similar experiments for the purpose of ascertaining the circumstances which determine the intensity of the current, and of discovering to what extent this intensity might be increased.

"On the 15th of May last, I took a plate of sheet zinc, twelve inches by sixteen, and having soldered to it a copper wire sixty feet in length, buried it two feet beneath the surface of the earth, on the north side of the Philosophical Hall of the college of New Jersey. A plate of sheet copper, nine inches square, was buried in a similar manner, twenty-seven feet from the former. The wires from these plates being together one hundred and fourteen feet in length, extended to the upper story of the hall, and were connected with a small galvanometer made by E. M. Clark, of London. The needle (which was two and three-eighths inches in length) was deflected with great violence, and finally settled at sixty-six degrees. The current of positive electricity flowed through the earth from the zinc to the copper plate, and thence through the air back to the zinc plate.

"When one of Morse's receiving magnets was substituted for the galvanometer, the armature was readily attracted, and after adding a single cup of Grove's battery for the local circuit, the register worked promptly and efficiently."

Prof. L. next mentions experiments from which he draws the following conclusion:

"Assuming now that the intensity of the current is measured by the tangent of the angle of deviation of the galvanometer, we find that a copper plate one inch wide and two inches long, yields one-half the current of a plate having *nine times* the amount of surface; and it yields one-fourth the current of a plate having *three hundred and twenty times* the surface.

"I now took a strip of sheet zinc, one-tenth of an inch wide and

twenty inches long, and having soldered to it a copper wire sixty feet in length, inserted it vertically in the ground near the Philosophical Hall. One end of the wire before mentioned, 760 feet in length, was dropped into the well 475 feet distant, without any plate attached to it. Upon connecting the two wires, the galvanometer settled at  $38\frac{1}{2}$  degrees. This current was sufficient to work the telegraph register with promptness and efficiency.

"The following experiments were made to determine the influence of the length of the conducting wire upon the intensity of the current. I attached a copper plate 14 inches by 24, to the end of a long wire, and immersed it in the well before referred to. When the zinc plate, twenty inches square, was connected with it, the length of wire in the circuit being 570 feet, the galvanometer settled at seventy degrees. When the length of wire was increased to 940 feet, the galvanometer settled at  $69\frac{1}{2}$  degrees. When the length of wire was increased to 1450 feet, the galvanometer settled at  $69\frac{1}{2}$  degrees. Thus it appears that when the length of the circuit was doubled, the intensity of the current was but slightly impaired, which seems to favor the idea that the current thus generated might be employed for telegraphing to considerable distances. Mr. Vail succeeded in telegraphing from Washington to Baltimore with such a battery. He does not expressly mention the size of the plates; but it is inferred that the copper plate was five feet long, by two and a half feet wide, and the zinc plate had probably about the same dimensions."

He next details an experiment "to determine how far the intensity of the current could be increased by multiplying the number of galvanic elements," the result of which, he says, "did not afford much encouragement for increasing the number of plates beyond two pairs of elements."

After the reading of the paper, "Prof. H. D. Rogers mentioned, that in a series of experiments published several years ago, in Silliman's Journal, by Prof. W. B. Rogers and himself, results were stated which would be found, he thought, to possess some practical interest, in relation to the conditions which influence the production of electric tension. The experiments referred to, seemed to prove that a far more intense electric action is procured, when the surface of the zinc element exposed to chemical action bears a small proportion to the copper surface, than when their areas are reversed.—They likewise indicated a remarkable exaltation of action when the acid or other chemical agent was heated; and it was found that after a progressive declension of the electric energy attendant on immersion, a quick restoration of power could be effected by withdrawing the plates for a brief interval, and wiping them."

## ART. V.—REV. THOMAS H. STOCKTON AND CHRISTIAN UNION.

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Among the pulpit orators of our country, there are few who occupy a more distinguished position than the Rev. Dr. Stockton. His recent abandonment of his former denominational association with the Methodist church, and his attempt to organize a society for the purpose of promoting christian union, will occasion much additional interest in his character and movements. The philanthropic character of the readers of this journal will doubtless give them an interest in regarding Dr. Stockton and his movement, from a scientific point of view.

Men of oratorical powers, and leaders of parties, are seldom represented with the exact fidelity of science, as the admiration which they excite secures the brilliant hues of the imagination in every popular portraiture.

In personal appearance, Dr. Stockton is slender, thin, and pale. A consumptive cough, which frequently interrupts his pulpit discourses, warns his hearers of the frailty of life; and the character of his countenance and voice add much to the solemnity of his thoughts. Yet thin and pallid as he may appear, there are firmness and precision in his gestures, an energy in his action, and often a commanding force in the tones of his voice, which effectually dispel the first impression, that he is trembling on the brink of the grave. As a speaker, Dr. S is remarkably impressive. His delivery is calm, steady, self-possessed, firm, lucid, and graceful. However deliberate he may be in reading a discourse, you perceive no difference between his reading and his extemporaneous delivery: all is alike calm, clear, firm, and well-measured. His faintest utterance is distinctly heard, and his loudest tones, when speaking with trumpet-like energy, are still self-possessed and well poised. There is but little pathos in his voice, little that is calculated to produce the genial out-pouring of universal love; but, instead of this, he has a deep sincerity, a pure, transparent earnestness, a zeal, so earnest and unaffected, so intense and thrilling as to seize with no little power upon minds which coincide with his own in convictions, and need only such an appeal to enforce a consistent performance of a recognized duty.

Such are his most striking traits and merits. But subordinate to these, is a rich and cultivated imagination, which has, perhaps, been still more influential in securing him his present reputation as an orator. He arranges, with great ingenuity and elegance, the imaginative embellishments of his discourses. With great facility he

pictures sublime scenery,—the heavens and the earth,—mountains and rivers,—the waters of life and the heavenly habitations of the departed. Yet his imagery seldom rises above the material. He appeals to the senses by scenic beauty, and often introduces ornaments which are scarcely necessary to the thread of his argument.

The frequent reference to heaven as a fine city, with its walls, gates, streets, and precious stones,—to the throne of Omnipotence, —to the *eyes* of the Deity, and his lightning-fringed robe,—partakes too much of the spirit of ancient Paganism to exert any elevating influence. The world, devoted to Mammon, necessarily thinks by material imagery alone; and in proportion as Divines and Poets sanction this materialism, by presenting divine and spiritual things only in a mechanical mode, such imagery, however beautiful, tends only to sanctify and embalm the spirit of materialism, which is identified with worldliness.

To return to Dr. Stockton. As a reasoner, he is exact, lucid, and ingenious; but deficient in depth, range, and comprehensiveness of thought. The character of his intellect is unfit for any great effort in the way of progress. He may detect falsehood, error, or inconsistencies; and form a compact, beautiful, and systematic doctrine, perfectly consistent with itself; but he has little capacity or inclination to enlarge his range of thought beyond his assumed premises, and advance from the deductive to the inductive philosophy.

Such being the character of Mr. Stockton's intellect and oratory, it is evident that he must be a brilliant, impressive, and influential preacher. It is equally obvious, that his sincerity and mental acumen would lead him to criticize and endeavor to perfect the spirit, organization, and life of his church. Hence it might be presumed that he would either endeavor to impel his brethren to advance in the career of Christianity, or would himself advance to an independent position. The latter has been the result. He has resigned his connection with the Methodist church, for which he was preaching,—not because he was opposed to its doctrines,—but because he perceived, too clearly, that the Christianity of the Bible was not embodied in any sectarian organization; that the precepts of Jesus Christ had not been really adopted as the rule of life; and that a separation into hostile sectarian bodies was totally incompatible with the spirit of true Christianity.

Hence, for the last three months, Dr. Stockton has been preaching to large and intelligent audiences, with the avowed purpose of establishing a church without sectarianism; a church which shall recognize all the followers of Christ as brethren; and which, while it receives the Bible, leaves to every individual the sacred right of private interpretation. This effort is indeed worthy of great honor. It is but the natural course of a fervently sincere and earnest spirit, penetrated with a profound reverence for the Scriptures, and seeking most earnestly to render the principles of Christianity a reality of daily life.

Such being his character and career, how do they correspond with phrenological indications? The practical phrenologist, who has heard of his fame as an orator, would be disappointed in the first glance at his cerebral conformation. His head is of but medium size, the forehead broad and receding. The face is characterized by no physiognomical beauty; and the whole head, though respectably developed, presenting no remarkable enlargement in the moral region. Upon closer scrutiny, however, he perceives that the breadth of the forehead, gives not only a development of the reasoning and ingenious intellectual powers, but a large amount of Ideality, Imagination, Reverence, and Sublimity,—faculties which he displays with unusual power in his prayers and appeals.

With such an organization and character, it is evident that Dr. Stockton, whatever he may do in behalf of christian union, is not the man to crush the spirit of sectarianism, nor to originate any organization which shall diffuse the spirit of brotherhood throughout the whole human race. That bright and glowing sentiment of universal love, which diffuses happiness among all around, and infuses into all minds an irresistible attractiveness, is not possessed, in any eminent degree, by Mr. Stockton. His tones, manner, and sentiment belong rather more to the Church Militant than to the Kingdom of Heaven. He is essentially, by organization and education, a sectarian,—a pure, fervent, earnest sectarian,—more consistent, earnest, and liberal than many others, but a sectarian still. He perceives clearly and denounces eloquently the defects of sectarian societies. He compares existing churches to a ruined and dilapidated aqueduct, through which the waters of life have ceased to flow; and he aims to establish a church, in which the spirit and life of the New Testament shall be more fully embodied; which shall obey the Divine commands of fraternal and universal love, and act in all things with an unceasing consciousness of the presence and will of the Deity. He will, doubtless, effect an improvement upon old-fashioned sectarianism. But when his work has been consummated, even if it should meet with the most triumphant success, he will still find that the work partakes of the character of the workman, and that his channels have not been sufficiently deep and broad to supply the wants of men. The defect lies in this; that in his own organization, the moral faculties are not sufficiently developed, nor so educated and enlightened, as to enable him correctly to appreciate, or efficiently to embody, the divine sentiment of universal love. It is not in his countenance, it is not in his manner, sincere though it be; it is beyond his experience: and no man can propagate that successfully which he does not fully possess.

Mr. Stockton will doubtless have an encouraging degree of success; for his talents will command it. A church edifice will be erected for him; and he will be supported in his ministry. But his great end cannot be attained; for he does not understand it. His sentiments have not been sufficiently elevated and enlarged by the

higher faculties; and he takes no sufficiently comprehensive views of man and the creation. He jealously watches a limited portion of the truth; and turns with indifference from the vast ocean of wisdom which is forever flowing at our feet. He loves the past too well to honor rightly the present and the future. He loves his doctrines too well to embrace all other truths. He loves his own favorite organization too well to appreciate other associations; and although he may succeed in founding a more catholic and liberal sect than others have founded, that sect, if it continue to exist at all, must ultimately become something far beyond the anticipations of its founder, and move onward with expansive love in the great tide of humanitarian progress.

The specific object of Dr. Stockton's labors, is the establishment of a Christian Association, or Church, in which the pulpit, the press, and the school shall all be biblical institutions, connected with, and controlled by, the church; and in which the organized benevolence of the church shall exercise a judicious and liberal providence for both the material and mental wants of the members. Such a scheme may have admirable results; or it may, on the other hand, become like many others, a meager and lifeless form. Judging from the world's past experience, the press and the school are more efficient for human progress when not connected with any ecclesiastical organization. Judging by the same experience, as to the effect of charitable associations connected with churches, we should not be led to entertain any very sanguine hopes of the efficiency of any such schemes. For some very sufficient reason, the streams of benevolence which flow through such channels, have been heretofore, but little trickling rills, instead of mighty streams. If we may rely upon the estimates of the most distinguished friends of temperance, Christendom, at this time, pays more in six months for demoralizing alcoholic drinks than all that has been expended, since the dawn of Christianity, for its propagation among the nations of the earth that sit in the shadows of Heathenism. Our so-called Christian nations and Christian governments enjoy themselves quite comfortably in the midst of an appalling mass of pauperism and crime; which they could, but will not, relieve. It requires something more than the machinery of a charitable association to bring forth benevolence. The nature of man must be thoroughly understood, and the inexhaustible fountains of love which it contains, must be brought forth by men and means far more efficient than any that are now in operation. If the true spirit of Christianity is to be incarnated in human society, the labor must be accomplished by men who can first incarnate that spirit in themselves, and who possess, also, intellectual powers amply sufficient to comprehend the nature of man, and to guide them in the great work of human redemption.

Undoubtedly, the abolition of sectarian discords will be one step toward the universal co-operation of good men in the spirit of fra-

ternity; it is gratifying, therefore, to observe that the disposition to abandon sectarianism is in active progress. Three conventions of the friends of Christian union have been held in the state of New York, in which a great variety of Christian sects were represented, and which held harmonious discussions, resulting in a general impression that sectarian divisions should and could be abolished. The first was held at Peterboro', the second at Syracuse, in the month of February last, and the third at Canandaigua, on the 17th of April.

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#### ART. VI. — ELIHU BURRITT—THE APOSTLE OF UNIVERSAL PEACE.

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THE arrival in Cincinnati of Elihu Burritt (the learned blacksmith), the Apostle of Universal Peace, has instigated the call of a convention to meet at Columbus, on the 18th of May, for the purpose of sending delegates to the Peace Congress which assembles at Frankfort, Germany, in August next.

In his lecture on the BROTHERHOOD OF NATIONS, which was heard by a very large audience, Mr. Burritt illustrated in a simple and lucid manner the apparent design of the Deity indicated by the very constitution of the globe, that all nations should dwell together in the most intimate harmony and mutual dependence. Each country, from the torrid to the frigid zones, produces with superior facility something almost peculiar to itself, for which other countries have need. Great Britain, for example, depends upon the United States for its supply of cotton, and millions of her population would be penniless if that supply should be cut off. The vast and increasing international commerce, and the immense emigration and travel of the present day, are continually adding to the ligaments of fraternal union. Two millions from the British kingdom, he computed, were at this time residing in the United States, and two-thirds of the annual increase of British population emigrates to our republic, leaving behind a million of relatives to whom they are attached. Two hundred thousand of the subjects of Victoria are residing in France, spending large sums of money and forming social connections and friendships. The English and French are fast losing, or rather have lost, the idea that they are natural hereditary enemies, and the people of many of the large cities of England have sent over to the people of the cities in France addresses breathing sentiments of friendship and cordiality.

England, France, and the United States possess three-fourths of all the maritime power of the world, and if they can but effect a proper understanding with each other, and resolve on the maintenance of universal peace, they will have the power to maintain it.

The Peace Congress, which assembled at Paris last August, was received with great honor by the French government, and enlisted the active co-operation of some of the most distinguished men of France. In the English Parliament, a small but respectable party, led by Richard Cobden, is thoroughly in favor of the peace movement, and so influential has this movement been already, that the Austrian government, while seeking anxiously in England for money to sustain its ferocious wars, has been unable to obtain more than a comparatively small portion of the loan which it sought. The Czar of Russia, when he came to England to borrow money, warned by the failure of Austria, disguised his aim and professed to need money to build his railroads!

The Peace Congress may be said to have already abolished the vexatious passport system in France. The delegates were admitted by the French government without passports, and about a month afterward the passport regulation was abandoned by the government entirely, thus removing another great hindrance to fraternity in Europe.

The great object before the Peace Congress at present—in the pursuit of which calm, clear-headed and practical men are engaged—is the abandonment of war, the dissolution of the costly standing armies, and the substitution of international arbitration for the sword.

Let the people of America espouse this cause—let us pour in petitions to congress to substitute arbitration for butchery, and let us interrogate every member of congress for whom we vote whether he is for peaceful arbitration or for military slaughter. This question may well override all others in national politics. What are all the errors of political parties compared with the gigantic brutality of this age in the form of war?

Europe, which is *professedly Christian*, but in reality *Pagan*, appropriates her choicest talent, her highest honors, and her greatest masses of wealth to the *butchery of mankind*. According to the estimates of Mr. Cobden, of the English Parliament, the standing armies of Europe (exclusive of police, national guards, &c.) amount to two millions three hundred and fifty thousand men, and the cost of their maintenance is *two hundred millions of pounds sterling* annually. Enough to render this world a paradise if rightly employed!

La Presse, an able newspaper published at Paris, gives the following statement of the miseries inflicted by war upon France:

“The army of 1813 was composed of recruits from eighteen to twenty years of age. *Illness, fatigue, and misery decimated them*. Of the 1,260,000 raised in 1813, there remained in 1814, to defend the soil of France, but *one hundred thousand men* above the ground. As the result of the various conscriptions made in France between the years 1791 and 1813, we find that *four millions five hundred thousand* Frenchmen were blown to pieces by



cannon, brought down by musketry, impaled upon bayonets, or cut down by broad-swords and sabers; and by all that sacrifice France obtained literally nothing—not so much as one square inch of ground added to its territorial limits in her wars of 1790.”

And what did the opposing party gain? The London Times calculates the losses sustained by the allies in their wars with France at TEN MILLIONS OF MEN. And this frightful butchery for no earthly good was perpetrated by *most Christian* powers—“defenders of the faith,”—heads of the Church—“the Lord’s anointed,” ruling by “divine right,” with all the sanctions of European religion (falsely called Christianity), and full of holy zeal against all infidelity—whilst themselves sustaining with gigantic power this vast system of diabolism for the oppression and murder of their fellow beings. O, boastful nineteenth century! hide thy head, overladen with conscious guilt!

Millions for murder! and a few scanty beggar-gifts for the salvation of mankind! The priesthood and aristocracy of Europe war against every effort for the amelioration of the condition of the people, but sanction war as a noble and holy employment. Look at the following blasphemy:

“Among the sixteen brass cannon taken by Com. Stockton on the Pacific, now at the Brooklyn Navy Yard, is one dated 1675. They generally bore the name of some particular saint stamped upon them. One of them is called ‘*Jesus!*’

“Two ships were taken by Nelson at the battle of Trafalgar, one was named ‘*The Saviour of the World!*’ and the other, ‘*The Holy Trinity!*’ both thundering *holy* three-deckers.

“When Genoa was taken by the British fleet, they found on one of the bastions twelve guns bearing the names of the twelve Apostles!”

*This must end!* Professing Christians must be aroused by appeals to the conscience. It is a favorable omen that the Archbishop of Paris, and the most distinguished Protestant clergyman of that city (Coquerel), were prominent members of the Peace Congress.

But who is this Apostle of Peace who has been laboring for free and friendly intercourse among the nations? There are few who have not heard of “the learned Blacksmith,” of Worcester, who acquired a knowledge of so many languages while toiling at the anvil. We naturally feel curious to behold such an example of persevering intellectual industry, and although he differs widely from the conception which most persons form in advance, he is well worth our study.

The first remarkable fact that strikes the phrenologist is, that notwithstanding his extraordinary reputation for lingual attainments, he has no remarkable development of the organ of Language. Neither according to the Gallian location, nor according to the Neurological system can we find a good development of that organ. But

in connection with a moderate organ of Language, we observe a bold, overhanging brow, presenting a large development of the perceptive and recollective organs, qualifying him to acquire a great amount of knowledge with facility, and to retain it well. In fact, he was born for a learned man, but not for a linguist. Such is his true character. He makes no display which would indicate a large organ of Language. He is neither talkative nor very fluent—he has no copiousness of words, nor variety of diction, but speaks in a simple, monotonous manner, in a chaste and intelligent style, which conveys his ideas very clearly, but which is equally free from verbose fullness and from needless ornament.

The acquisition and use of a spoken language depend upon the organ of Language, and the adjacent organ of the sense of sound; but the acquisition of a printed or written language depends mainly upon the organs which take cognizance of the appearance and forms of the letters. Hence any one possessing large perceptive and recollective organs may make proficiency in the study of languages, unless the organ of Language be signally deficient. The organs of Reflection and Combination, which give prominence to the upper and the lateral portion of the forehead, give great assistance in this study by enabling us to understand language philosophically, instead of learning everything by mere memory.

The study of languages was not the most natural direction of Mr. Burritt's powers, and accordingly, for the last seven or eight years, his energies have turned from that pursuit to one more congenial to his natural organization,—the promotion of national welfare and international fraternity.

In person, Mr. Burritt is tall and well-formed; but not stout. His countenance is benevolent and calm, but has very little of animal force; there is nothing of sensuality or passion about it; indeed, it is almost boyish in simplicity. This smooth and passionless face is relieved by a very intelligent eye, resting beneath a jutting brow, which at once informs you of the clearness and soundness of his intellect. The face is rather narrow; and indicates at once to the Neurologist a healthy, hardy constitution, which could never carry the marks of indolence or sensuality. The organs of Indolence, Disease, Alimentiveness, Sensitiveness, and the animal passions, generally, are of so moderate a development, as to leave in unrestrained ascendancy the higher moral sentiments. The elevated and rounded contour of the upper surface of his head, (displayed by his baldness), indicates the decided predominance of Philanthropy, Hope, Religion, and Firmness,—the proper organization for a philanthropist,—while his large Locality, and other knowing organs, would lead him to take extensive views of the world as his field of labor, and to proceed upon facts rather than upon theories. Such is the man,—a mild, persevering, practical philanthropist.

In his public addresses, he displays a thorough knowledge of his subject, and appeals to the good sense of his hearers in a calm and

pleasing manner. The basilar organs of his brain are too small to impart much excitement or animation to his delivery, which is of the grave, monotonous character, which is sometimes found in a dull, old-fashioned clergyman. Occasionally, as his strain of thought, elevated by philanthropy, leads him to the contemplation of great principles and results, he rouses up with a greater degree of energy, and delivers eloquent conceptions in an appropriate manner. It is much to be desired that we had a few more such men as Mr. Burritt, who could steadily pursue the promotion of the welfare of mankind, bound down by no sect or party, and appealing to no bad passion, but sending forth words of truth and soberness.

Mr. Burritt edits a newspaper, at Worcester, entitled the "Christian Citizen," devoted to his favorite objects, in behalf of which he has spent much time in Great Britain, and has taken great pains in distributing suitable documents, and in securing the co-operation of good men in England and the United States.

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#### ART. VII.—A GRAND DISCOVERY.

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SINCE the dawn of science there has never been a more important discovery, for the wealth and welfare of mankind, than that which has recently been announced by Mr. Paine,—in the *decomposition of water*. If it be true, that water can be decomposed with the facility which is now claimed, it will produce a grand revolution in all industrial pursuits. The use of *decomposed water for fuel and light*, will save the world more than a thousand millions of dollars annually in fuel alone. The domestic nuisance of smoke, dirt, and ashes will be removed,—the labors of the dingy coalman will be ended,—the face of nature will no longer be marred by cutting down the forest for fuel,—the dingy, sooty city will again become clean and pure—the whale will float undisturbed in the ocean,—oil, lard, and tallow will no longer be used for lighting,—horse-power will no longer be used upon any species of machinery, for the cheapness of fuel will render steam far preferable,—the prices of all metals will fall, and machinery will become cheaper,—machinery propelled by steam, generated with decomposed water for fuel, will be applied to many species of industry, which now employ manual labor. The productive energies of the world will be incalculably increased,—the soil will be relieved from the necessity of supporting beasts of burden, and will, therefore, support a larger population—all manufactured goods will be cheapened,—food will participate in the general reduction, and the rewards of labor will consequently be enhanced. All these, and many other consequences will result if the discovery of Mr. Paine should prove true,

and verify in practice the anticipations which have been formed. Whether it be of practical importance or not, the public have not yet been enabled to determine, but the following publications will give an idea of what is claimed.

The Washington Union published a few months since the following communication; vouching for the scientific intelligence and integrity of the writer.

*"Messrs. Editors.*—I am authorized to announce the discovery and practical test of the most important scientific invention ever yet produced, or brought to light since the world has been inhabited by man.

"The first and main feature, and foundation of this invention, which at once opens a field for hundreds of other inventions, is the discovery, by Henry M. Paine, Esq., of a ready and almost expenseless mode of decomposing water and reducing it to the gaseous state. By the simple operation of a very small machine, without galvanic batteries, or the consumption of metals or acids, and only the application of less than one three-hundredth ( $\frac{1}{300}$ ) part of one-horse power, Mr. Paine produces 200 cubic feet of hydrogen gas, and 100 feet of oxygen gas, per hour.

"This quantity of these gases (the actual cost of which is less than one cent), will furnish as much heat by combustion as 2,000 feet of ordinary coal gas, sufficient to supply light equal to three hundred common lamps for ten hours; or to warm an ordinary dwelling-house twelve hours, including the requisite heat for the kitchen, or to supply the requisite heat for one-horse power of steam. This invention has been tested by six-months' operation applied to the lighting of houses, and recently the applicability of these gases to the warming of houses, has also been tested with perfectly satisfactory results. A steam-engine furnace and a parlor-stove, both adapted to the burning of these gases, have been invented, and measures taken for securing patents therefor.

"Mr. Paine has one of his machines, new and elegant, now in full operation and publicly exhibited, and may be expected to exhibit the same in this city within twenty days. The only actual expense of warming houses by this apparatus is that of winding up a weight (like the winding of a clock) once a day; and the heat produced may be as easily graduated and regulated as the flame of a common gas-burner. No smoke whatever is produced, but a very small quantity of steam, sufficient to supply the requisite moisture to the atmosphere. In its application to the production of steam-power, it will reduce the expense to the mere wear of machinery, and will immediately produce an immense demand for steam-engines, and induce the establishment of thousands of manufacturing mills, reduce the expense of traveling, and increase the demand for agricultural produce, while it ruins the coal and gas business, and such manufacturing establishments as depend on monopoly and high prices.

"This invention, moreover, removes completely the only obstacles

which have hitherto existed to aerial navigation—the difficulty of procuring hydrogen gas, and carrying a supply of fuel; and it may now be considered a matter of tolerable certainty that men will be seen swiftly and safely soaring in different directions before the first of May next. These facts, being of immense importance, should not be longer withheld; and I therefore would avail myself of your widely-circulating journal to present them to the public.

“Yours, respectfully,

R. PORTER.

“Washington, Dec. 22, 1849.”

Since the foregoing publication, I have been impatiently anticipating the public demonstration promised by Mr. Porter. Although this has not yet been given, intelligent gentlemen, who have witnessed Mr. Paine's operations, have given public assurance that the scheme is in successful progress, and that all who are concerned in oil, gas, and coal business, may prepare for a revolution. The last publication on the subject is the following from Mr. Paine, published in the *Scientific American*.

“THE ELECTRIC LIGHT, &c.—I had determined not to notice any remarks made by anonymous writers in the public journals, on the subject of the Hydro-Electric Light, deeming the fact of its public existence and action sufficient refutation of the many absurd attempts to disprove the discovery of a new principle, instancing the failure of the same experiments when presented under the guidance of old theories. Had I at any time asserted that I had produced the rapid decomposition of water by the same means and process that has hitherto been taught by the books and the schools, I should deservedly have made myself the subject of newspaper ridicule—the theme of anonymous penny-a-liners. But as I have from the first claimed the discovery of a *new* principle, and the production of new results, I deny the right of any one, or the possibility, however honest he may be, to sit as arbiter on the matter, until such time as the nature of the discovery is made known, and as for a few weeks past I have been busily engaged getting a new apparatus ready for public inspection abroad, which would satisfy those skeptics whose distance from this city has prevented a personal examination of the apparatus. I have not had time nor inclination to notice the many absurd paragraphs, pro and con, which appear in the public journals; and the only consideration which now urges me to make this communication, is that it is both due to the public and myself to make such an explanation as will relieve the curiosity of the one, and extricate the other from the unpleasant position which the enthusiasm of his friends has placed him in.

“During the winter of 1844–5, the late Col. Bomfort, of the Ordinance Department, and myself were engaged in some experiments, having for their object the precipitation of silex (in solution), by the action of electricity; it being expected that glass so formed would be very dense, and consequently possess a high refractive power. During the course of experiments I became satisfied that

so long as the whole body of water around the poles remained a conductive or diffusive medium, the action of the passing currents would be limited, and the results desired unattainable. With this view of the subject I sought for some method by which the atoms of water in contact with the poles, could be effectually barred from communication with any conducting substance, and yet admit of a continual supply of the water to be decomposed.

"Believing in the doctrine of imponderability and immateriality of the electric fluid, all efforts to accomplish the desired result failed; and the experiment was about to be abandoned, when a doubt as to the truth of the books, on the question of the nature of electricity arose in my mind, and on the faint hope held forth, the experiments were renewed, and the results more than realized the most sanguine expectations, for not only was the insulation of the water perfect, and the decomposition rapid, but the electric fluid was found to be susceptible of accumulation and condensation to an unlimited degree. The ease and rapidity with which the water was resolved into its component gases, naturally suggested the idea of applying the discovery to some practical use, and that of light was elected, as the most simple and inexpensive in its application. But on the very threshold of the experiment an apparently insurmountable obstacle was met in the inability to separate the gases. After a number of serious explosions, the entreaties of my family compelled me to desist.

"Although the practical experiments were abandoned, the mental action on the subject was not, and during some time in the fall of 1848, I concluded that the law which demanded an aqueous communication between the poles, or that the positive and negative poles should both enter one body of water, was not correct—a conclusion which a very simple experiment decided to be correct. One pole was inserted into a glass of water in the corner of a large room, and the other pole in another glass in the opposite corner, and an electrical communication made between. All the water in one glass was decomposed, and hydrogen only obtained. All the water was decomposed in the other, and oxygen only obtained. The result was known, the experiment was considered fully successful, and a small electromagnetic apparatus, having its helices kept in motion by clock-work, was put in operation at my dwelling, and was found capable of supplying three burners with an abundance of the gases. It was at this period of the experiments that I issued the circular announcing the discovery, and with it an invitation to the citizens of this place to call and examine for themselves.

"In the spring of 1849, a light-house was erected on an eminence, near this city, and the experiment tried on a large scale for several months, at the light-house, beside the lighting of a store in the city, the results being entirely successful in both places, and fully justifying the assertions made in the circular of announcement; and here I wish it to be understood, that this must not be considered a

mere statement of mine, but the history of the fact is familiar to all whose appreciation of the discovery was sufficient to prompt them to visit my tower or dwelling.

"The experiments at the light-house continued until September, when an explosion occurred which cost a momentary damp upon the bright prospects of the discovery. This explosion was not due, as intimated by 'Carbureted Hydrogen,' to the explosive nature of the gases, but to an entirely different cause—one peculiar to the construction and action of the instrument under consideration.—That state or action of electricity known as galvanism, produces decomposition; while that known as intensity, causes repulsion to take place at the electrodes, and deflagration of decomposing cells is the consequent result. It was to the latter action that the explosion referred to was due, the gases being fired by the melting electrode. The realizing of the possibility of such an accident made it apparent that some method should be desired, other than that of personal observance, to prevent such explosions in future. The same agent that caused the danger must be made to remove it; this was no easy task, for, independent of the natural difficulty in the case, the press was teeming with scurrilous inuendoes, the only difference in whose tenor was, that one journal consigned me to contempt as a humbug, and another to confinement as a lunatic. It is well, however, for the cause of science, that inventors are generally stubborn beings, firmly believing that they are able to perform all they promise, against all the sneers or contempt that may be brought to bear against them; and so in this case, perhaps, the 'captious' feeling saved the invention, for the difficulty was overcome, and the apparatus made to govern itself, by the breaking of its circuits when a surcharge is passing.

"It has required the labor of months to accomplish this last mentioned part of the invention, and although at the period of writing this, the danger of an explosion is entirely removed, yet the loud reports made by the breaking of the circuits are deemed adverse to the successful introduction of the invention to the public, but it is confidently expected that even this difficulty will be overcome in the course of a few days. Meantime the apparatus and its action is the daily subject of inspection at my rooms in the Exchange—nothing being screened but the interior of the helices and electrodes. The whole process of the decomposition can be seen, and if necessary, felt.

"The result of all the experiments up to this date are as follows:

The descent of a weight of 67 lbs. a distance of 9 feet, will generate 800 cubic feet of the gases, at no other expense than the cost of the apparatus, say \$500. You may use the gases for light, power, or purposes of caloric (I have as yet experimented only with the former), and make your own deductions.

"I receive many letters from your readers, asking what I claim as my invention: permit me here to reply, that I claim to have *dis-*

covered a new principle in electricity, viz: ponderability, materiality, and obedience to the laws of gravitation. I claim to be the first to accumulate and compress the electric fluid; and I claim to have invented a machine or apparatus which enables me to use the electric fluid for useful purposes in the arts and sciences, at no other cost than the interest of its price.

HENRY M. PAINE.

"WORCESTER, March 7, 1850."

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## ART. VIII.—THE GREAT MYSTERY

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Is a mystery still! The mysterious knockings and spiritual dialogues which have been going on in New York still have hosts of believers and disbelievers, both of whom affirm that they have faithfully and conscientiously investigated the phenomena. Here, at a distance from the scene, we can only hear the parties who testify for and against, and await the slow progress of investigation. As intelligent men, it is our duty to look at both sides, and neither to believe every wonderful story from respectable sources, nor to adopt without reflection every hasty newspaper squib, denouncing it as a humbug or detected trick.

The most plausible explanation of the knockings, among the skeptics, is that they are produced by the toes of the impostors; but this, although it might suit many cases, would not explain those in which the sound was heard out of doors, or jarring objects at some distance from the parties. As to wonderful revelations from the spirits, the skeptics say that they are as often wrong as right, and that the rapping is no better than guesswork in all its manifestations. A respectable clergyman of Auburn publishes in the *Tribune* a long account of his experiments in the way of questioning, from which it appears, that in his case the answers were all wrong, and that the spirits gave very lame excuses for their blunders when told they were wrong.

On the other hand, a subscriber of the *Journal* sends me the following extract from the letter of a friend at Auburn:

"These manifestations still continue, and still increase in interest and extent; although, by newspaper paragraphs, they are daily 'found out,' 'exposed,' 'exploded,' and all that. Brother, we know what we are doing: we are not groping in the dark. I have contested all the ground, inch by inch, and my skeptical organization has left no loop-hole unnoticed, no stone untouched, to find out whether there was any other way to account for these strange things. Let those cry 'humbug' who will; they are the deceived ones, not we who have proved the matter. Ten thousand questions will arise of the *why* of all these things; but time alone will settle that matter." &c. &c.

Another subscriber of the *Journal* has published in a *Cleveland*



Herald the following interesting narrative of his observations. The editor of the Herald expresses the utmost confidence in the writer, although he cannot accredit the phenomena.

"ROCHESTER RAPPINGS.—*Mr. Harris:* As but little, if anything, has appeared in this community upon this subject, save articles of ridicule and denunciation, will you permit me to record for the benefit of honest and independent inquirers, and in fulfillment of a promise made to certain individuals residing in various localities, what I have seen and heard with my own eyes and ears, touching this remarkable phenomenon. And I can assure all such that my senses were in healthy action, that they were not beclouded with prejudice, pro or con, nor by any physiological or mental hallucination of any kind that could interfere with a fair and candid examination of the *facts*, as they really occurred.

"I devoted two days to the investigation, was privileged with several interviews, and witnessed the spiritual manifestations, as they are called, in three different forms, and that which I am about to relate is and has been an every-day occurrence for the last eighteen months, and in the presence of hundreds of different individuals, from every part of the country—I would further state that the rappings are witnessed in different places in Rochester, and in different towns in Western New York.

"Without expressing my own opinion upon the subject, I would state that these manifestations are deemed *spiritual* by the persons connected with them, and in speaking of them I shall use their language. They uniformly address them as spirits, or by the names by which they were called in this sphere of life.

"It is usual, upon the arrival of a stranger, to request him to be seated at the table around which are seated two or more of the family—the family consisting of the mother, Mrs. Fox, and her three daughters—when the question is asked—'Will the spirit converse with this gentleman?' If the answer is affirmative, there are one or more raps distinctly heard from the floor or table or other parts of the room. If in the negative, perfect silence. When yes or no will not convey the proper answer, there are raps, usually five, for the alphabet, in which case one of the party repeats the alphabet, A, B, C, D, &c., until you arrive at the letter commencing the first word of the communication or answer, when there is a rap, and so on until the sentence is spelled out. Thus: Upon my being seated at the table, an entire stranger to them all, the question was put by one of the ladies—'Will the spirit converse with this gentleman?' Answer by raps—'Yes.' I was then permitted to ask such questions as I chose. I asked—'Have I guardian spirits present?' Ans. 'Yes.' Ques. 'How many?' Ans. Raps for the alphabet, when was spelled out clearly and distinctly—'Father, Mother, William.'—Ques. 'At what age did William die?'—Ans.—the correct age. Ques. 'Will you give my wife's name?' Ans.—raps for the alphabet, and 'M-a-r-y-A-n-n' was immediately spelled out.

Some other questions were asked, and in all cases correct answers given. After which the alphabet was called, and 'd-o-n-e' was spelled, and I was informed that no further communication could be had at that time.

"Upon rising from the table, I expressed a strong desire for a test by causing the table to move, whereupon one of the ladies asked—'Will not the spirit gratify the gentleman by causing the table to move?' Very soon I discovered a tremulous motion in the table, and it was moved from one to two feet directly from me and against the girls, and pushing them off from their balance. I expressed myself satisfied for that time, and left.

"At a previous interview in another room, when there were present at the commencement of the conversation with the spirit, only one of the young ladies of the family, myself, and another gentleman and lady, as the two latter were leaving, the spirits were addressed by them, and answers by raps were heard on the doors, floor, and other parts of the room. Among the questions put and answered were the following: Ques. 'Are you happy?' Ans. 'Yes.' Ques. 'More happy than you were when here?' Ans. 'Yes.' Ques. 'Are all spirits happy?' Ans.—raps for the alphabet, and the following sentence distinctly spelled out—"All those are happy here who were happy there." They then said, 'Good night spirits,' and there was an immediate response by quick and successive rappings at different points upon the floor.

"At another time, when were present eight or ten individuals beside the family, all of whom save three had had previous interviews, and as we were all seated around the table, some with paper and pencils taking notes, one of the family inquired, 'Will the spirit now converse with us?' Ans. 'Yes.' I inquired 'Will they converse with me?' Ans. 'No.' Another inquired, and a similar answer. Then a rap for the alphabet, when one of these three were called for, whereupon he asked 'If there were any of his guardian spirits present?' Ans. 'Yes.' Ques. 'Who?' Some were named, the same, as the gentleman informed the company, as were named in a similar manner at Auburn. He then made other inquiries, among which I recollect he asked them to tell him the state, county, and town, where he was born, all of which were correctly answered, as he informed us, and the alphabet was called and 'done' was spelled, and he could get no further response. The other two were permitted to ask questions, all of which were answered correctly, as they informed the company, and as each asked a reasonable number of questions, *done* was spelled to each. At the conclusion, *done* was spelled to the whole company, and no further answers could be obtained.

"At one of the interviews I asked if their rappings could be witnessed in Cleveland. Ans. 'Yes.' Ques. 'When?' Ans. 'Soon.' Ques. 'How soon?' Ans. 'Very soon.' Many other

questions were asked, and in every instance correct answers were given. I also witnessed the rappings in answer to questions by two of the young ladies while standing out of doors, in the day-time, upon a brick pavement.

"As I have before remarked, similar facts have been witnessed daily, for the last eighteen months, by thousands of individuals from every portion of the country, and it would be as rational and consistent to deny the existence of such a place as Rochester, as to deny their reality; and it seems to me equally absurd and ridiculous to attribute them to the agency of those ladies in whose presence they are usually witnessed.

"They are utterly incompetent for such a work, and moreover their character and standing, as admitted by all who know them, forbid the thought that they would practice such a deception upon the community. If such is the fact, it is asked, whence come these *intelligent* rappings?—and, *cui bono*, and for what object do they exist? That's the question to be solved, and our crying humbug, and denouncing as fools and fanatics, all such as believe the evidence of their senses, and are independent enough to acknowledge it, will never disprove their existence, or disclose their origin.

"*They* claim them to be communications from the next sphere or spiritual world, and to prove these claims they offer the testimony of divers individuals of high character and standing, that they have received communications which were known only to such deceased friends and themselves. They urge, too, the character of the teachings which are received as being pure and holy, and such as are really calculated to benefit and bless mankind. Moreover that such communications are nothing novel, but have been witnessed in all ages of the world. But it is objected that these rappings and movements of tables, &c., are undignified and ill suited to the character of spirits. To which they reply that it is not for them to prescribe modes of operation, or the manner in which they shall arrest the public attention. That if they are spirits, it is presumed that they know best how to work, and that we ought to sit as listeners and learners, rather than as teachers and fault-finders. That the tree will be known by its fruits, and that time will determine its character. That, moreover, their operations are not more undignified and childish than many of the communications recorded in the Bible, as direct from God himself—viz: Judges, vii—6, xii—6. That by such a variety of tests all classes of mind and all the senses are addressed and thus the sooner the world will listen to the teachings from the spiritual world.

"I therefore would recommend to all such as cannot or dare not believe the testimony of others, and will believe what they see and hear with their own eyes and ears, to go and witness this most singular phenomenon. Such as wish more testimony, and the history of the affair from the beginning, will be accommodated by purchas-

ing a small pamphlet just published by Mr. Dewey, of Rochester, for sale at Pearson's.

J. M. STERLING.

"CLEVELAND, March 18, 1850."

The pamphlet of Mr. Dewey above mentioned, is thus alluded to by the N. Y. Tribune:

"We copy from this pamphlet the following statement from observation by Rev. C. Hammond, of Rochester, which seems worth looking into. Mr. Hammond had been once to the house where these manifestations are mainly made, heard nothing extraordinary, beyond the mere fact of the 'Rappings,' and went away as skeptical as he came, but returned afterward with the following result:

"During the interval, I had prepared my mind with certain questions, touching events unknown to the family, and of a remote date. The sounds told me my age precisely, though my appearance is such as to indicate a difference of eight or ten years. The names of six of my nearest deceased relatives were given me. I then inquired, 'Will the spirit, who now makes these sounds, give me its name?' Five sounds directed me to the alphabet, which I repeated until the name of 'Charles' appeared, which answered to an infant child whom we consigned to the grave in March, 1843. To my inquiries, it gave me a true answer in regard to the time it had been in the spirit-land, and also the period since my eldest sister's death, which was nearly eighteen years; the latter fact not being recollected then, I found true by dates on my return home.—Many other test questions were correctly answered; and yet, notwithstanding the origin of these sounds seemed inexplicable, I was inclined to impute them to mesmerism or clairvoyance. However, as the spirit promised to satisfy me by other demonstrations, when I came again, I patiently awaited the opportunity.

"On the third visit, I was selected from a half dozen gentlemen, and directed by these sounds to retire to another room, in company with the 'three sisters' and their aged mother. It was about eight o'clock in the evening. A lighted candle was placed on a large table, and we seated ourselves around it. I occupied one side of the table, the mother and the youngest daughter the right, and two of the sisters the left, leaving the opposite side of the table vacant. On taking our positions the sounds were heard, and continued to multiply and become more violent until every part of the room trembled with their demonstrations. They were unlike any I had heard before. Suddenly, as we were all resting on the table, I felt the side next to me move upward. I pressed upon it heavily, but soon it passed out of the reach of us all, full six feet from me, and at least four from the nearest person to it. I saw distinctly its position; not a thread could have connected it with any of the company without my notice, for I had come to detect imposition, if it could be found. In this position we were situated, when the question was asked, 'Will the spirit move the table back where it was before?'—and back it came, as though it were carried on the head

of some one, who had not suited his position to a perfect equipoise, the balance being sometimes in favor of one side and then the other. But it regained its first position. In the meantime the 'demonstrations' grew louder and louder. The family commenced and sung the 'spirit's song,' and several other pieces of sacred music, during which accurate time was marked on the table, causing it to vibrate; a transparent hand, resembling a shadow, presented itself before my face; I felt fingers taking hold of a lock of hair on the left side of my head, causing an inclination of several inches; then a cold, death-like hand was drawn designedly over my face; three gentle raps on my left knee; my right limb forcibly pulled, against strong resistance, under the table; a violent shaking, as though two hands were applied to my shoulders; myself and chair uplifted and moved back a few inches; and several slaps, as with a hand, on the side of my head, which were repeated on each one of the company, more rapid than I could count. During these manifestations, a piece of pasteboard, nearly a foot square, was swung with such velocity before us as to throw a strong current of air in our faces; a paper curtain attached to one of the windows was rolled up and unrolled twice; a lounge immediately behind me was shaken violently; two small drawers in a bureau played back and forth with inconceivable rapidity; a sound resembling a man sawing boards, and planing them, was heard under the table; a common spinning-wheel seemed to be in motion, making a very natural buzz of the spindle; a reel articulated each knot wound upon it; while the sound of a rocking cradle indicated maternal care for the infant's slumbers. These were among many other demonstrations which I witnessed that evening, amid which I felt a perfect self-possession, and in no instance the slightest embarrassment, except a momentary chill when the cold hand was applied to my face, similar to a sensation I have realized when touching a dead body. That any of the company could have performed these things, under the circumstances in which we were situated, would require a greater stretch of credulity on my part, than it would be to believe it was the work of spirits. It could not, by any possibility, have been done by them, nor even attempted, without detection. And I may add that near the close of the demonstrations at this visit, there was a vibration of the floor as though several tons in weight had been uplifted and suddenly fallen again upon it. This caused everything in the room to shake most violently for several minutes, when the force was withdrawn.

"I have also tested the intelligence of these spirits in every way my ingenuity could invent. On one occasion I wrote a word on a slip of paper privately, placed it in my wallet, went there, and the sounds through the alphabet, spelled that word correctly as I had written it. That word was 'Sibyl.'

"On the 20th February inst., the two youngest sisters made my family a visit. Here the sounds were heard—questions involving

subjects wholly unknown to them were answered—a large heavy dining table was moved several times—and on expressing thanks at the table to the Giver of all good, some six or eight sounds responded to every sentence I uttered, by making loud and distinct sounds in various parts of the room.

“‘Yours, truly,

C. HAMMOND.

“‘Rochester, Feb. 22, 1850.’”

The above statement of physical manifestations is corroborated by the pamphlet of Barron and Capron, from which I published extracts in the last number. There are, doubtless many, who consider all such statements a sufficient proof of imposture; but it must be borne in mind, that my own psychometric and cerebral experiments were considered, a few years ago, quite as marvelous and supernatural as these. Those who have become acquainted with clairvoyance and other wonderful phenomena of mesmerism, and who know how often valuable truths are set down as utterly incredible, because marvelous, should not condemn anything whatever or form any decided opinion upon matters of fact without a patient investigation of the evidence. If this whole matter should prove a delusion, it will still be no less instructive in showing us better how to guard against deception hereafter. If it prove to have merely *a few grains of truth*, we shall be well repaid for our investigation; but if it should all prove substantially true, will it not be the dawning of a brilliant era?

All I contend for in this matter is, a proper spirit of philosophic patience and impartiality in making investigation and awaiting the progress of truth. All will be clear in time.

There are many whose impatience or disgust will not allow them to give any attention to such matters as these. But he who is not willing to examine anything, however improbable, cannot be a successful disciple of Nature. The hunter in pursuit of game does not withhold his eye from scrutinizing every foot-print or trace of its passage, however improbable it may be that the game is near at hand. So the philosopher, in the pursuit of new truths, should never fail to scrutinize everything which even professes to contain aught of truth—and culpable, indeed, would he be, if from animal passion, from contempt, impatience, or disgust he should refuse to examine anything in which conscientious and careful observers believe that they have found a valuable truth.

[The pamphlet of Mr. Dewey may be obtained from Stratton & Barnard, of Cincinnati, at the price of ten cents. Its title is as follows: “History of the Strange Sounds or Rappings heard in Rochester and Western New York, and usually called *THE MYSTERIOUS NOISES*, which are supposed by many to be communications from the Spirit World; together with all the explanation that can as yet be given of the matter. Rochester. D. M. Dewey. 1850.” Containing 79 pages.]

## Familiar Table-Talk.

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**ILLUSTRATIONS OF NEUROLOGY.**—A physician in the northern part of Ohio writes as follows; under date of January 16, 1850 :

"I have been making some interesting experiments in Neurology. When I commenced reading your Journal, I was quite skeptical in regard to your location of organs, but I have recently been testing the matter upon a young lady of energetic temperament and sound health. The experiments thus far are decidedly satisfactory, and such as to firmly convince me of the truth of your system of Neurology. Upon applying the hand to any one of the organs, without her knowledge of the locality or function of the same, she will immediately describe with clearness her impressions; which, in all cases, correspond precisely with their functions."

Again, January 24, he writes as follows:—

"In that letter, which you have probably received, I stated that I had satisfied myself of the truth of Neurology, by some experiments which I had made. Since then I have carried the matter some further. The individual upon whom my experiments have been made, has the organs of Foresight and Clairvoyance developed in a remarkable degree. She stated that she had often been impressed beforehand with events, which actually occurred as had seemed to her would occur. Being called one day to see a child, which I considered beyond the reach of medicine, I gave it as my opinion to the parents that the child would not live until the next morning. I went directly home, and without making any statement in regard to its condition, excited the organs of Foresight and Clairvoyance; and asked the young woman if she could see the child. She said she could, and described its appearance correctly. I then asked her if it would live: she replied it would not. It died that night. She had never been in the house, but described the room where the child lay accurately. The next day I was called to see a child, aged five weeks, suffering from an attack of Pneumonia. The parents had administered Lobelia, but without any beneficial effect. Judging from all appearances, the little sufferer could not live twenty-four hours unless speedily helped. On going home, I again excited the organs of Foresight and Clairvoyance, and requested her to look at this child, and tell me whether it would live. She said it would. Her prediction was contrary to all of those who saw it, but turned out right. The child is well. She has several mornings told me whether I would have any new calls during the day. When she says I will, she always tells whether

it will be a child, man, or woman to whom I will be called; and she is invariably correct. I might add much more if time would permit."

A medical friend, residing in the western portion of New York, writes as follows:—

"About three weeks since a woman was drowned near here, in Oak Orchard Creek. After one whole week's fruitless search, up and down the stream, for the body, a young man in the mesmeric sleep was consulted, who told the friends where the body might be found. In a few hours time the body was found hanging to a snag, precisely as described by the clairvoyant."

Another correspondent, of Cayuga Co., New York, writes as follows:

"A young clairvoyant, four miles from here, gave directions, on the 1st of December, for finding the body of Nathan Adler, a peddler who was murdered on the 6th of November, (which had been sought for in vain for five days by the whole vicinity), so accurately, that a gentleman who heard him went the next morning directly to the place, three quarters of a mile into the woods; one of them even stepped upon the body of the fallen tree in the top of which the body lay, but perceiving no signs of it, and having little confidence in Clairvoyance, went on, and the body was not found until nearly night. Nevertheless, it is *indubitably* true, that the place was accurately pointed out by the clairvoyant!"

The following narrative, signed E. H., is from one of the most respectable citizens of Cincinnati, (formerly Mayor of the city), and the statements are well known to be true, as the facts were quite public. It was excluded from the last No. by the want of space. Mr. Rodgers is styled Professor (a title our newspapers seem disposed to give every public lecturer on any science), and he accepts that designation as very convenient.

"Cincinnati, Feb. 18th, 1850.

"**PROF. RODGERS,—Sir:** The following case came directly under my own observation, and agreeably to your request, I furnish you with the following description of it:—

"Miss Lucy, a young lady residing in our family, was put in the mesmeric state by Prof. Rodgers during the present month; she remained in that condition two weeks—her eyes were closed during that period—nevertheless, she walked about the house, went with young ladies, her companions, to Prof. Rodgers's room, and to Mrs. Rodgers's lectures, ate, drank, and enjoyed her natural sleep. She was sociable, and conversed with her friends as though she were in a perfect waking state.

"She had complained for more than two years of great pain and distress in her left side, which was sometimes so intense as wholly to prostrate her strength. An eminent physician, a relative of hers, now deceased, more than one year ago, examined her case, and declared that her heart and lungs were affected, and that unless she could obtain relief, her case might ere long prove fatal.



"Soon after Prof. Rodgers had placed her in the mesmeric state, she said she ought to remain in that condition two weeks; that until the end of one week she would be getting worse; and then would be getting better until the end of the second week. She now prescribed for herself, and the medicine prescribed (a simple herb), was administered to her in the form of tea, during the two weeks.

"The first week she took very little food; the second week she required more.

"When Prof. Rodgers, at the end of the second week, awakened her, or rather brought her out of the mesmeric state, she said it seemed that she had been asleep about two hours. She declares, that she remembers nothing which transpired during her mesmeric sleep. She says she is now free from pain or distress of any kind, and that she confidently believes, with proper care, she may be permanently cured.

E. H."

MR. SPENCER, a well known lecturer and demonstrator of mesmerism has been in this city some time. He is said to have successfully applied the controlling power over his subjects to *curing their bad habits*,—such as drinking liquor, chewing tobacco, &c. This is a very laudable undertaking. Unfortunately, those who have bad habits are not always sufficiently impressible to be managed in that way.

DR. B. B. WILLIAMS, a spirited, successful, and enthusiastic lecturer and demonstrator of Mesmeric phenomena, has been attracting the public attention throughout the southern states for the last two or three years. At the last dates, he was in Mobile. Dr. W. is a graduate of the Eclectic Medical Institute. His operations are favorably noticed by the newspapers and by his private classes.

MR. VAUGHAN has forwarded another essay on Organic Chemistry, which will appear in the next number. He says, in a private letter:

"My late researches have been very successful; and the result of them I intend to publish in a work of about two or three hundred pages, which I am now engaged in preparing.

"A friend of mine, who has just returned from Europe, has brought with him the French translation of my first essay, which was published in Paris some time since. He informed me that the scientific men of Paris had taken a deep interest in my theories, and expressed a great desire to obtain the rest of my writings, which he promised to send them, and which will no doubt be shortly re-published in the French language. I intend, after the publication of the present article, to lay before them my articles in the Journal of Man. I think that your discoveries will be appreciated by the French physiologists, on account of the great and unavailing labor which they have devoted to ascertain the connection of matter and mind.

"I understood, before my departure from Cincinnati, that my essays were reviewed in some French or English periodicals."

"A KEY TO THE SCIENCE OF ELECTRO-BIOLOGY: all its secrets explained with full and comprehensive instructions in the mode of operation, and its application to disease, with some useful and highly interesting experiments. *Every Person an Operator.* By a Professor of the Science. Cincinnati, 1850." Such is the title of a pamphlet of 15 pages, just published and sold at 15 cents in this city. As this subject is connected with a great deal of delusion and imposition which should be removed, I shall notice this pamphlet as the first publication presenting anything tangible on the subject. It opens as follows: "The Science of Biology, or the relation of electricity to the mind, is a subject of vast meaning, and one that, if rightly understood, would work a greater revolution in the mental world, than all the mechanical inventions that have ever been produced. That the science has arrived at its maturity would be vain for me to contend. But it has been reduced from theory to practice, and now the field is open," &c., &c. This is a mere piece of pretense and delusion—the pamphlet contains not a single statement of any established relation between mind and electricity, or any discovery or principle whatever in reference to such a connection. The title of Electro-Biology, therefore, is nothing more or less than a mere catchword to excite curiosity. The writer proceeds to enumerate the common experiments of mesmeric exhibitors, which are too familiar to need repetition. These constitute *the secret*—a secret well known to almost every intelligent operator in mesmerism for some years past. The writer seems to think he has done the public a service in thus promulgating the secret, and that he will be execrated by the lecturers who have been in the habit of charging ten dollars for such *secrets*. Truly, the practice of charging large sums for these very small items of knowledge, cannot be approved by sound moralists, and if done under pretense of imparting *secret knowledge* of great importance, it becomes really culpable. True, the smallest fragment of anthropological science is fully worth ten dollars—but if the same knowledge may be obtained in print for ten or twenty cents, the practice of selling it at a high price, *as a secret*, cannot be justified. This pamphlet may answer a good purpose, in showing those who have been misled, by a new and fallacious name, that there is really nothing new in the experiments or secret.

The "*secrets of Electro-Biology*," so called, are as follows, according to the pamphlet:

"The science of Electro-Biology is divided into five grand divisions, or numbers. The first, is mesmeric passes; passes made from the head downward, in order to induce the state, and then upward, to arouse the subject. These are not very essential, until a communication is formed between the operator and the subject."

"The second, is a testing operation, or grip. I say testing, because it can be ascertained whether a person stands electrically negative to yourself, or not. Upon this principle, it would be well to remark here, that a person must be in the negative to the operator, in order to produce the experiment. Two positives repel each other; but if a positive come in contact with a negative, we can affect the subject immediately. It is ascertained by placing the thumb of the right hand on the fore-arm nerve, on the back of the hand, between the large and ring-finger bones, and the other fingers of your hand in the palm of his." [This rigmarole of positive and negative is sheer nonsense. It is not true that an impressible subject is necessarily negative. The anatomical directions are equally absurd. There is no nerve of any importance at the point mentioned, but merely a small irregular branch of the ulnar. You may press upon any other point, from the head to the foot, with equally satisfactory results.—EDITOR.] "During this operation, it is necessary for you to keep the attention of the subject upon you; that is, let his eyes be placed on yours, and look at him firmly, maintaining throughout the entire operation, a positive manner toward the subject. In the meantime, make passes over his eyes from right to left, occasionally placing your thumb back of the eyes, and on the eye-brows: then make a few passes before his eyes with the palm of your hand; you next tell him to close his eyes; make passes downward, over them; impress him thoroughly that his eyes are closed; after which place your thumb at the top of his nose, in the region of the skull, between his eyes." [This locality answers very well for the purpose of subduing the individual to a passive state, as it is on the intuitive region of the brain.—EDITOR.] "Tell him that he cannot open them; if he make the effort, and does not succeed, you may be certain that he is a good subject.

"This part of the experiment is the most important of this science; and in reading it, great caution should be observed, that you may perform your operations successfully, and without failure. As we are not all charged with the positive and negative properties, some means should be resorted to, in order to bring us into that state.—We have a coin, the metal of which is composed of three different substances, zinc, copper, and silver. By placing this coin in the center of the hand, and remaining quiet for the space of fifteen minutes or half an hour, in the meantime keeping the eyes steadily fixed upon it, a galvanic current is soon formed, and the individual finally becomes a fit subject for operation. If it is not produced the first sitting, by repeating, it is sure to effect what we desire."

[This combination of metals is entirely unnecessary; if the eye be fixed upon anything else, the same effect will be produced. By placing the fore-finger upon the forehead, at the root of the nose, and gazing steadily upon it, the somnolent and passive condition may be produced more readily.—EDITOR.]

"The fourth division teaches us the doctrine of impressions.—

Electro-Biology controls us when awake, and in order to carry out this principle it is necessary for us to impress the subject firmly, that he cannot do otherwise than as he is directed. For example, you tell a person, when under your control, that he cannot raise his feet from the floor, then make a downward movement with your hand, in a positive manner; hence you will perceive the movement is beyond his control. You must govern by your voice, in order that the effect may be certain. It is essential that you understand this part of the experiment well, that you may be good operators.—From the simplest to the most complicated experiments it is necessary that you be very *positive* in making impressions, in order to induce the subject to obey voluntarily.

“The first experiment, or closing the eyes, is done partly by impressions. You must tell him positively that he cannot open his eyes, in order to keep them closed. So all through in controlling voluntary motions, accompanied by the usual passes from the head to the extremities of the limbs, that you intend to govern. If you design to control the mind, or the different sensations which exercise the mind, to become acquainted with what is passing around it, you will be required to study impressions entirely.

“To control the sight, an impression must be made upon the brain by your voice and manner. For instance, you tell the subject that your cane is a serpent: if you can control his mind, you make the impression on the brain, that he discovers what you intended he should.

“The other organs of sensation are acted upon by the same principle, or ‘modus operandi.’

“For example, we place a coin, or any convenient substance on the hand, and make the impression on the brain that it will burn him, a sense of heat will evidently be communicated from the hand to the brain, and there impressed, which will also convey a sense of pain, which will cause him to withdraw his hand immediately.

\* \* The greater part of the experiments, humorous or otherwise, which are generally exhibited by lecturers on Biology, require on the part of the operator, simply good nerves, and a calm, collected mental state.

“You must always assume a positive appearance toward your subject, and make the impression in a clear, firm, and unwavering tone of voice. If the subject fails to be affected, try another experiment; if you do not succeed in this, make an impression on his mind that you can accomplish it by getting further control of him. Some are not easily affected; when you succeed in governing their voluntary motions, others that you have more difficulty in controlling, can be readily managed through the organs of sensation. You will sometimes affect a person so thoroughly, that it becomes necessary to use the utmost caution, so as not to leave any bad impression on his mind. With such a person, it is better to take the recollection of what you have been doing away from him. This is accom-

plished, by placing your hand upon the front part of his head, and making backward passes, impressing him with the fact that you are taking his memory away from him; continue until he does not recollect his name, or that of his most intimate friend." [This is in accordance with true Neurological principles, but it is not necessary to make any passes when the subject is sufficiently passive and credulous to be controlled by the voice entirely.—ED.] "Then impress him that he will not recollect what has transpired throughout the operation, unless you leave some pleasing remembrance; impart to his understanding a sense of health, strength, agreeable emotions, &c.; next bring back his memory with a sense of a good one; after which, withdraw your control in the following order:—Say to him, when I count three, and bring my hands together, you will be awake, or I will withdraw my control from you. It will be necessary for you to observe these rules in order to become a good operator, and never express any doubt of your success, in the presence of the person upon whom you are making the effort."

This is the sum total of the revelation. It is to be hoped after this exposure of the emptiness of these pretensions, so far as any claim to novelty is concerned, that the name *Electro-Biology* will be quietly dropped by all concerned, and that the friends of science will no longer encourage or use terms that have been so perverted. Of the author of this anonymous pamphlet, I know nothing,—his motives are probably good, but his attainments are moderate.

**ELECTRO-BIOLOGY.**—"Principles of the Human Mind, deduced from Physical Laws; together with a Lecture on Electro-Biology, or the Voltaic Mechanism of Man. By Alfred Smee, F. R. S., with Illustrations; pp. 64; price 25 cents." Such is the attractive title of a little book or pamphlet published by Fowlers & Wells.—The reading matter consists merely of the essay on *Electro-Biology* published in the last number of this Journal, with a few preliminary pages of vague generalities and definitions scarcely worth reading.

**"PHRENOLOGY AND THE SCRIPTURES.**—By the Rev. John Pierpont—(pp. 44; price 12½ cents). Published by Fowler & Wells." This is a lecture delivered before a phrenological society at New York. The author has long been known as a bold defender of truth, without reference to popularity, and as one of the ablest clergymen and finest poets of our country. The lecture is a clear, philosophical, and satisfactory production, the circulation of which cannot fail to do good.

**"MORALISM AND CHRISTIANITY,—OR Man's Experience and Destiny.** In three lectures. By HENRY JAMES. New York, published by J. S. Redfield, 1850." This is a pamphlet of fifty-three closely printed pages, sold at 25c., written by HENRY JAMES; one

of the ablest and most progressive radicals of the day. From a hasty glance, I perceive that it manifests the usual ingenuity and profundity of James; who understands remarkably well the artistic effect of words and sentences judiciously arranged. His merits and defects of style are similar to those of Carlyle, but much less outlandish. He embodies in this pamphlet a sublime species of optimism, deifying the constitution of man, and endeavoring, metaphysically, to put an end to our scorn and hatred of the criminal. Its aims are noble; but from the want of simplicity and completeness, it can do little but stimulate thought. It is quite probable it will be misunderstood, and that evil inferences will be drawn from its teaching, which I cannot suppose its author would sanction, but to which it seems really liable.

"ANTHROPOLOGY, or the science of man,—in its bearings on War, Slavery, &c." This pamphlet is rather a theologico-political than a scientific production. The author, who writes with earnestness, takes his own innate moral sense of right and wrong as the standard by which all institutions and doctrines must be tried, and applies it boldly in his criticisms upon prevalent religions and governments. It is always well to listen to the voice of conscience; and when a vigorous writer appeals to such an oracle, it is well to listen to the responses given to him, and then compare them with the teachings of our own internal monitor.

The NEW YORK TRIBUNE, which may be styled the great American Newspaper—a worthy organ of the spirit of the age,—has just been enlarged to an extent which renders it not only the best, but the cheapest of newspapers, being of twice the average size of dailies. At present it circulates in the United States 39,720 weekly, 15,360 daily, and 1680 semi-weekly:—total 56,760,—beside an extensive circulation abroad. It is fortunate for our country that so potent an influence is wielded by so good a man as Greeley.

The LITERARY UNION, published at Syracuse, New York, is one of the best monthly magazines of our country; its spirit and aims are noble. The PROTECTIVE UNION, a newspaper devoted to the interests of labor and social progress, published by the printers, at Boston, is truly an able, interesting, and useful journal. FOWLER'S WATER-CURE JOURNAL, at New York, and FOSTER'S GREFENBERG WATER-CURE REPORTER, published at Utica, are doing a vast deal of good. Each is published monthly at \$1 per annum. There are several other Journals which want of space forbids my noticing.

The ECLECTIC MEDICAL JOURNAL, edited by Drs. J. R. Buchanan and T. V. Morrow, is published monthly, in Cincinnati, at \$2 per volume of 12 numbers—[48 pages each]. This Journal is devoted to medical improvements generally, and especially to the Eclectic Medical Reform. It also pays much attention to Homœopathy and Hydropathy. The present is the ninth volume of the Journal.





*Benjamin*